

SHOP MANUAL

KOMATSU

avance **LOADER**

WA250-3

Machine model Serial number

WA250-3 **50001 and up**

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require. Materials and specifications are subject to change without notice.
- WA250-3 mount the S6D95L and S6D102E engine.
For details of the engine, see the 95 and 102 Series Engine Shop Manual.

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FOREWORD

GENERAL

This shop manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgments. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This shop manual mainly contains the necessary technical information for operations performed in a service workshop. For ease of understanding, the manual is divided into the following chapters; these chapters are further divided into the each main group of components.

STRUCTURE AND FUNCTION

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

In addition, this section may contain hydraulic circuit diagrams, electric circuit diagrams, and maintenance standards.

TESTING AND ADJUSTING

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs.

Troubleshooting charts correlating "Problems" with "Causes" are also included in this section.

DISASSEMBLY AND ASSEMBLY

This section explains the procedures for removing, installing, disassembling and assembling each component, as well as precautions for them.

MAINTENANCE STANDARD

This section gives the judgment standards for inspection of disassembled parts.

The contents of this section may be described in STRUCTURE AND FUNCTION.

OTHERS

This section mainly gives hydraulic circuit diagrams and electric circuit diagrams.

In addition, this section may give the specifications of attachments and options together.

NOTICE

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Use the specifications given in the book with the latest date.

ELECTRIC WIRE CODE

In the wiring diagrams, various colors and symbols are employed to indicate the thickness of wires.

This wire code table will help you understand WIRING DIAGRAMS.

Example: 5WB indicates a cable having a nominal number 5 and white coating with black stripe.

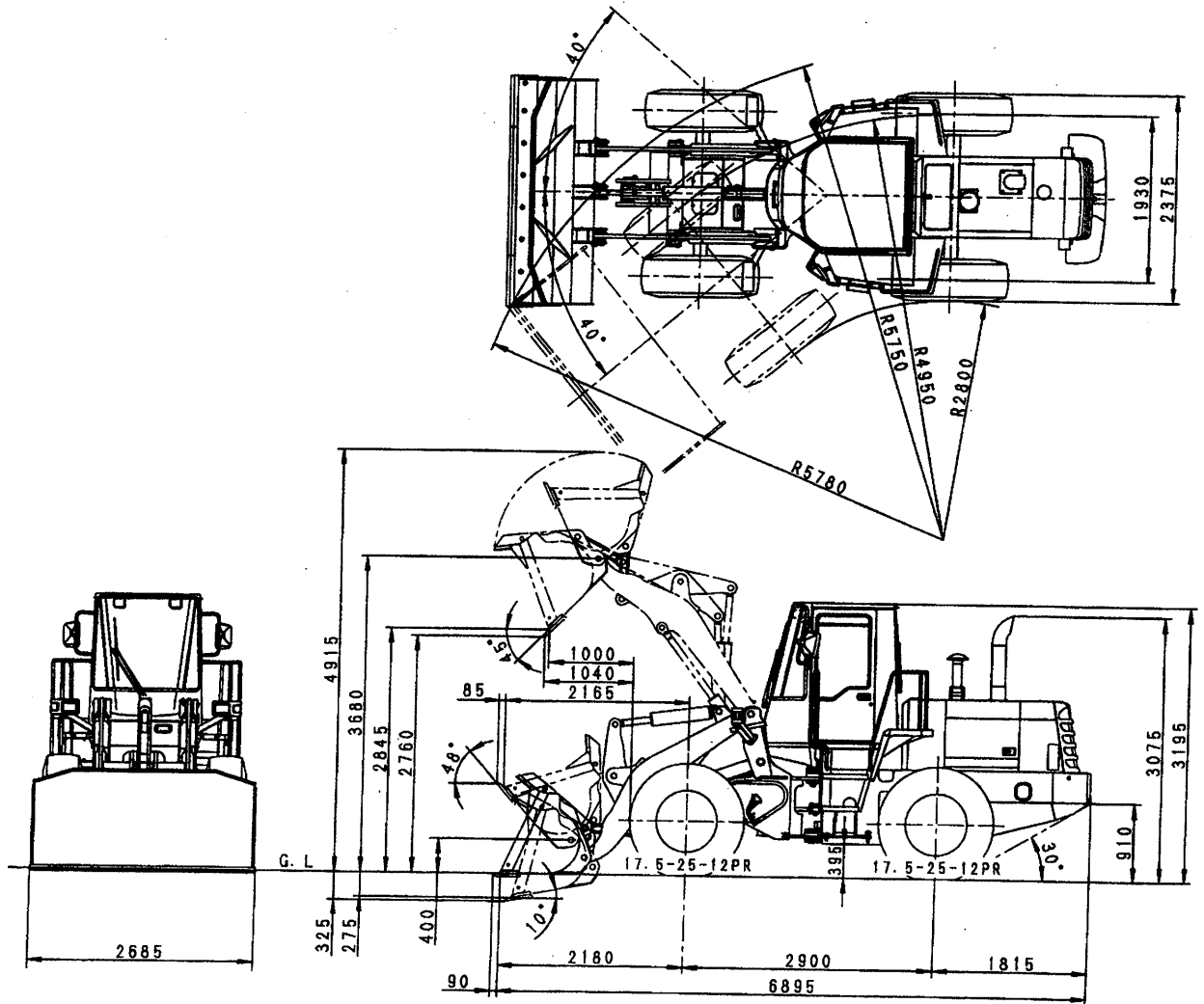
CLASSIFICATION BY THICKNESS

Nominal number	Copper wire			Cable O.D. (mm)	Current rating (A)	Applicable circuit
	Number of strands	Dia. of strands (mm ²)	Cross section (mm ²)			
0.85	11	0.32	0.88	2.4	12	Starting, lighting, signal etc.
2	26	0.32	2.09	3.1	20	Lighting, signal etc.
5	65	0.32	5.23	4.6	37	Charging and signal
15	84	0.45	13.36	7.0	59	Starting (Glow plug)
40	85	0.80	42.73	11.4	135	Starting
60	127	0.80	63.84	13.6	178	Starting
100	217	0.80	109.1	17.6	230	Starting

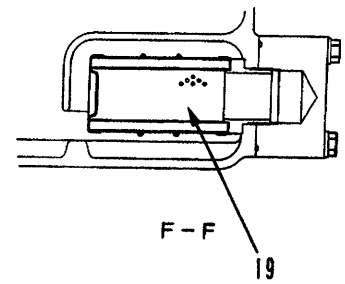
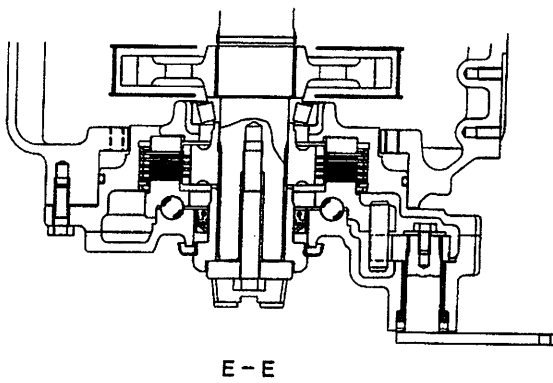
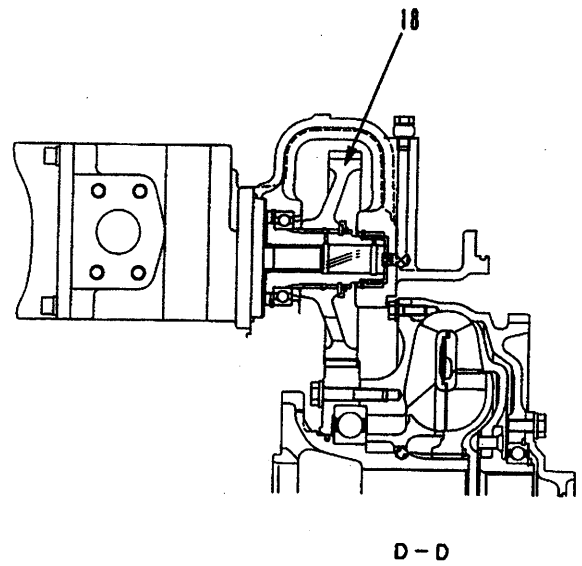
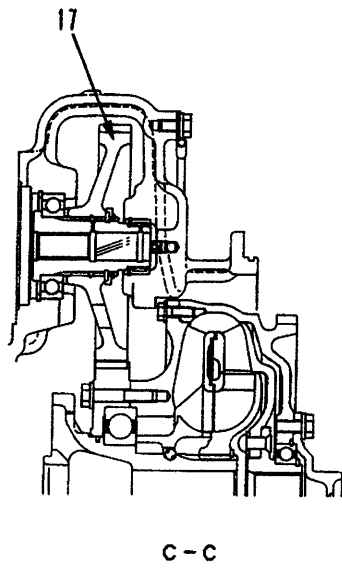
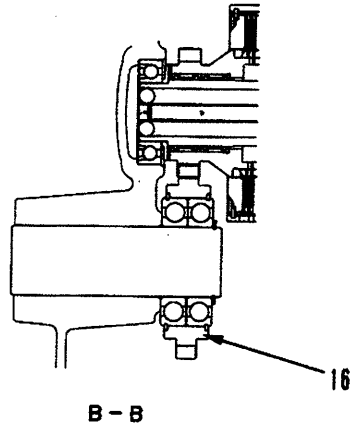
CLASSIFICATION BY COLOR AND CODE

Priority	Classification	Circuits							
		Charging	Ground	Starting	Lighting	Instrument	Signal	Other	
1	Primary	Code	W	B	B	R	Y	G	L
		Color	White	Black	Black	Red	Yellow	Green	Blue
2	Auxiliary	Code	WR	—	BW	RW	YR	GW	LW
		Color	White & Red	—	White & Black	Red & White	Yellow & Red	Green & White	Blue & White
3		Code	WB	—	BY	RB	YB	GR	LR
		Color	White & Black	—	Black & Yellow	Red & Black	Yellow & Black	Green & Red	Blue & Yellow
4		Code	WL	—	BR	RY	YG	GY	LY
		Color	White & Blue	—	Black & Red	Red & Yellow	Yellow & Green	Green & Yellow	Blue & Yellow
5		Code	WG	—	—	RG	YL	GB	LB
		Color	White & Green	—	—	Red & Green	Yellow & Blue	Green & Black	Blue & Black
6		Code	—	—	—	RL	YW	GL	—
		Color	—	—	—	Red & Blue	Yellow & White	Green & Blue	—

Serial No.: 53001 and up



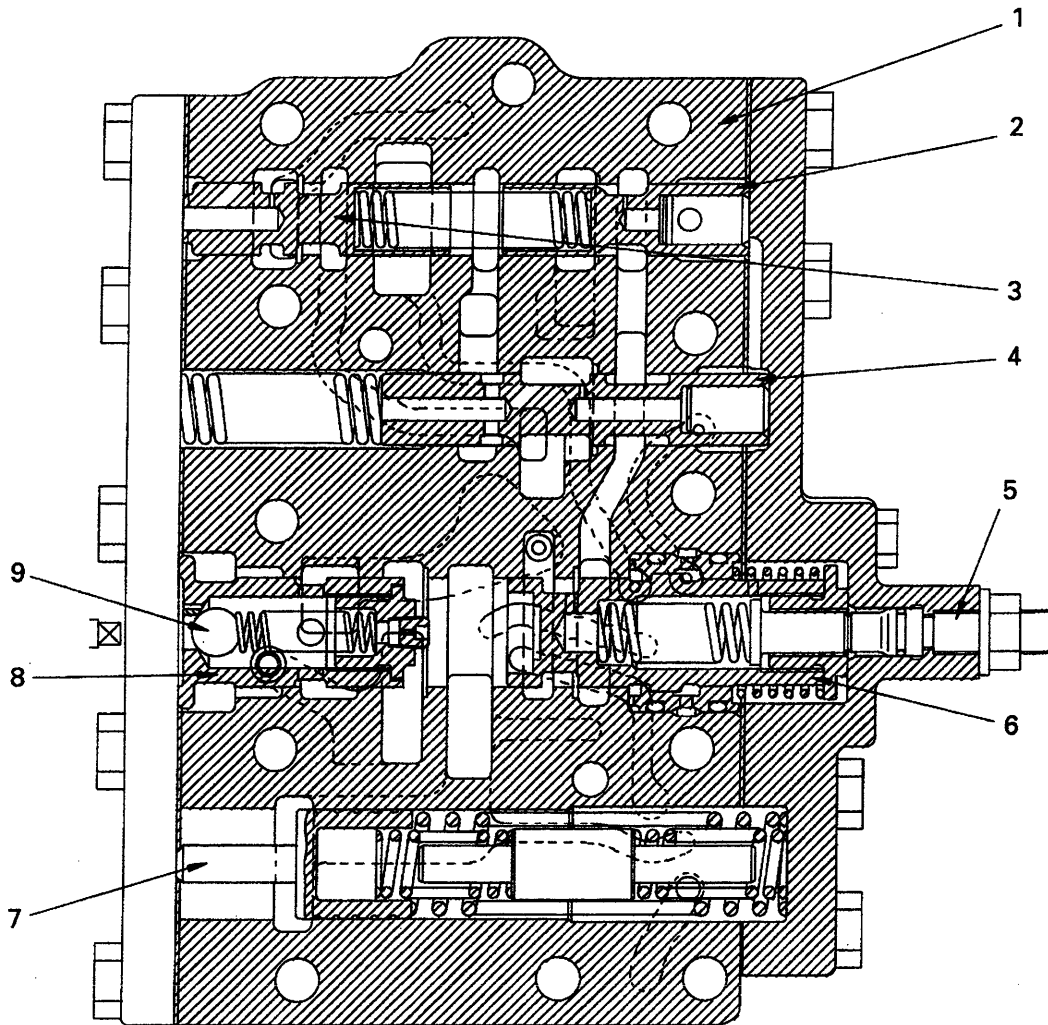
SWW03494



SWW03498

- 16. REVERSE idler gear (Teeth: 35)
- 17. Gear (Teeth: 75)
- 18. Gear (Teeth: 67)
- 19. Strainer

UPPER VALVE



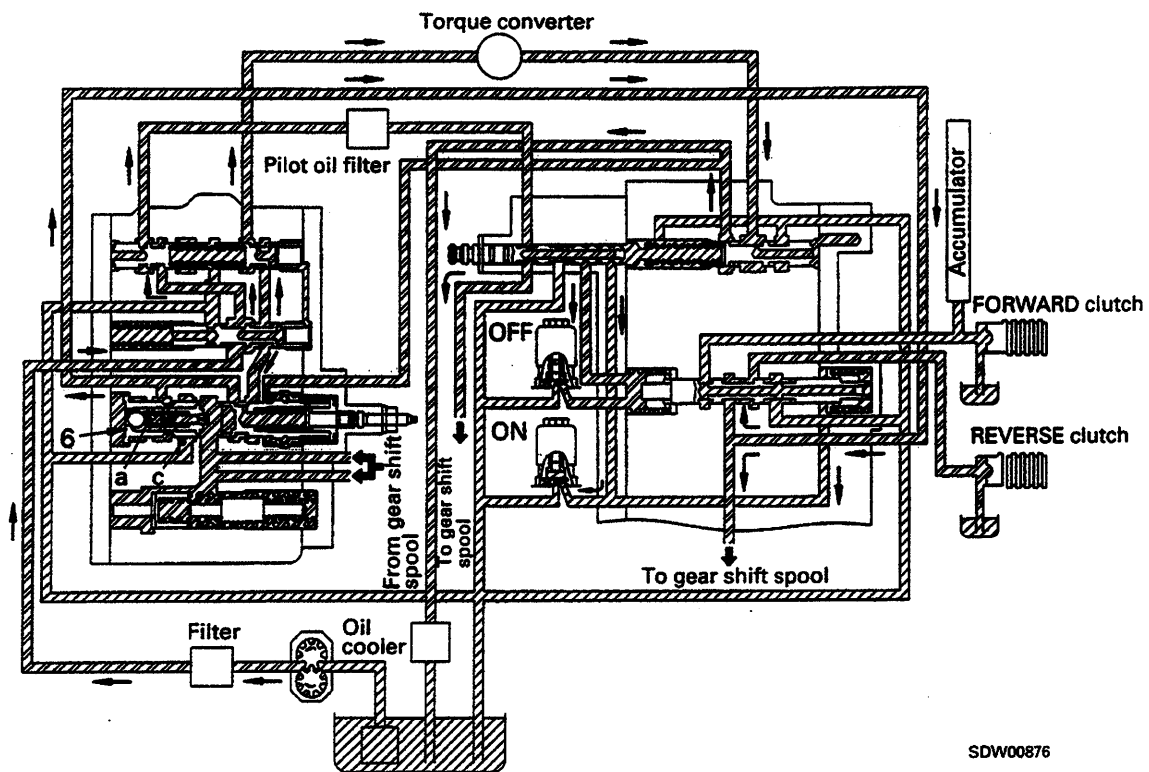
A-A

SDW00858

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- | | |
|---|-----------------------------------|
| 1. Upper valve body | 9. Check valve |
| 2. Main regulator valve | 10. Lower valve body |
| 3. Pilot reducing valve | 11. Torque converter outlet valve |
| 4. Priority valve | 12. FORWARD and REVERSE spool |
| 5. Modulation fill valve pressure adjusting screw | 13. HIGH and LOW spool |
| 6. Modulation fill valve | 14. Speed range spool |
| 7. Accumulator | 15. Solenoid valve |
| 8. Quick return valve | 16. Emergency manual spool |

3. Clutch pressure starting to rise (clutch pressure at point C)

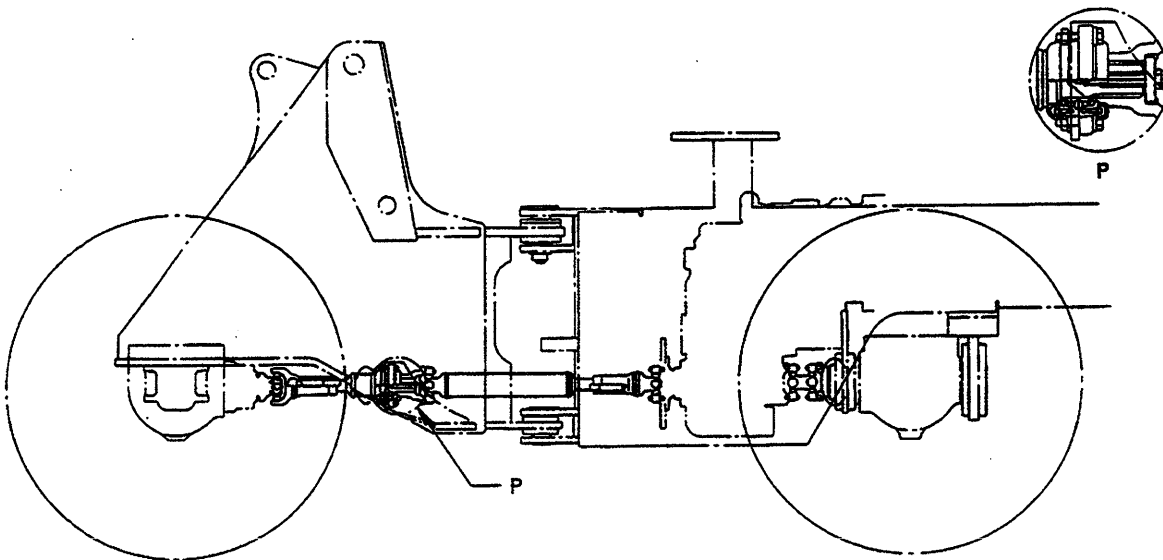
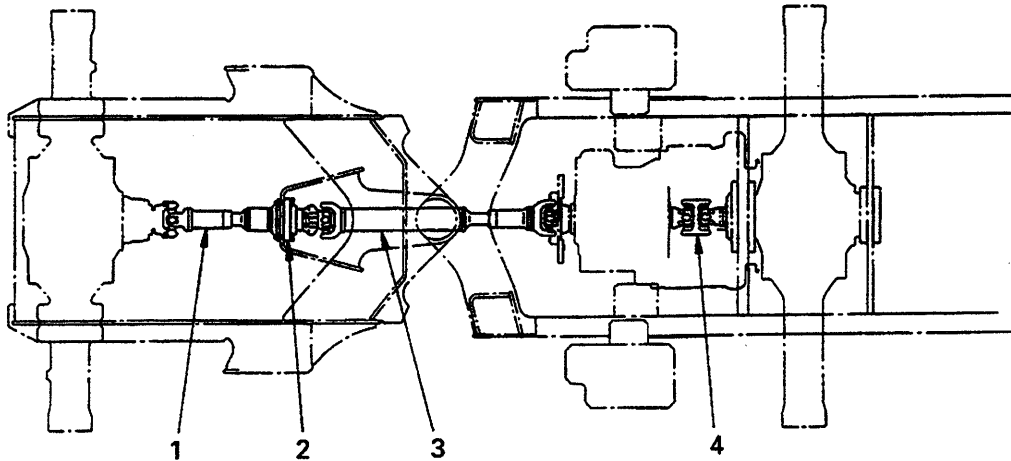


SDW00876

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- The oil from the pump fills the REVERSE clutch and the pressure in the clutch circuit starts to rise. As a result, the pressure at port a rises, so quick return valve (6) is moved to the right in the direction of the arrow, and closes drain port c.

DRIVE SHAFT



- 1. Front drive shaft
- 2. Flange bearing
- 3. Center drive shaft
- 4. Rear drive shaft

Outline

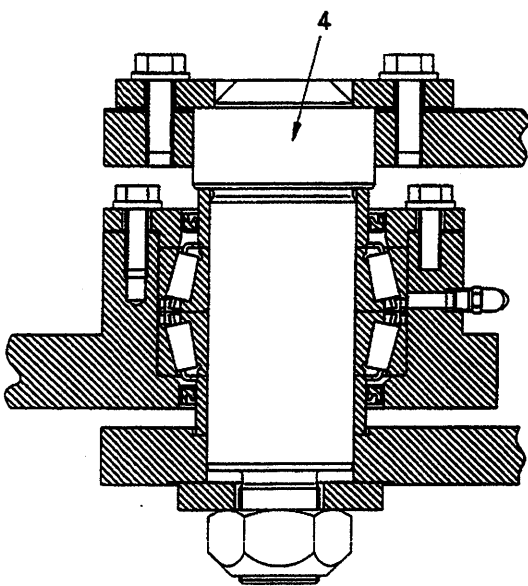
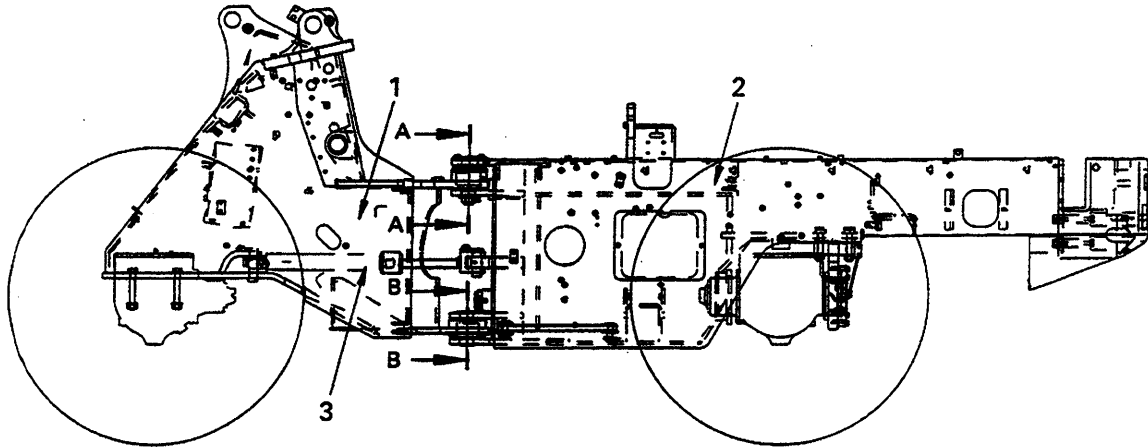
- The motive force from the engine passes through the torque converter and the transmission. Some of it is transmitted from rear drive shaft (4) to the rear axle, while the rest goes from center drive shaft (3) through flange bearing (2) and front drive shaft (1) to the front axle.

- The drive shaft has the following purpose in addition to simply transmitting the power. The drive shaft has a universal joint and sliding joint to enable it to respond to changes in the angle and length. This enables the drive shaft to transmit the motive force when the machine is articulated and to protect the components from damage from shock when the machine is being operated or shock from the road surface when the machine is traveling.

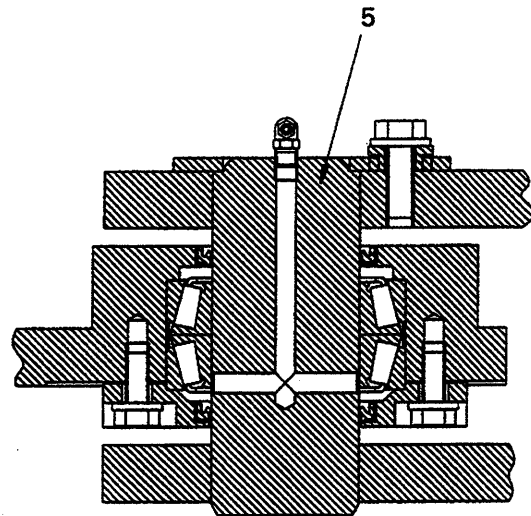
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CENTER HINGE PIN



A-A



B-B

SMW01131

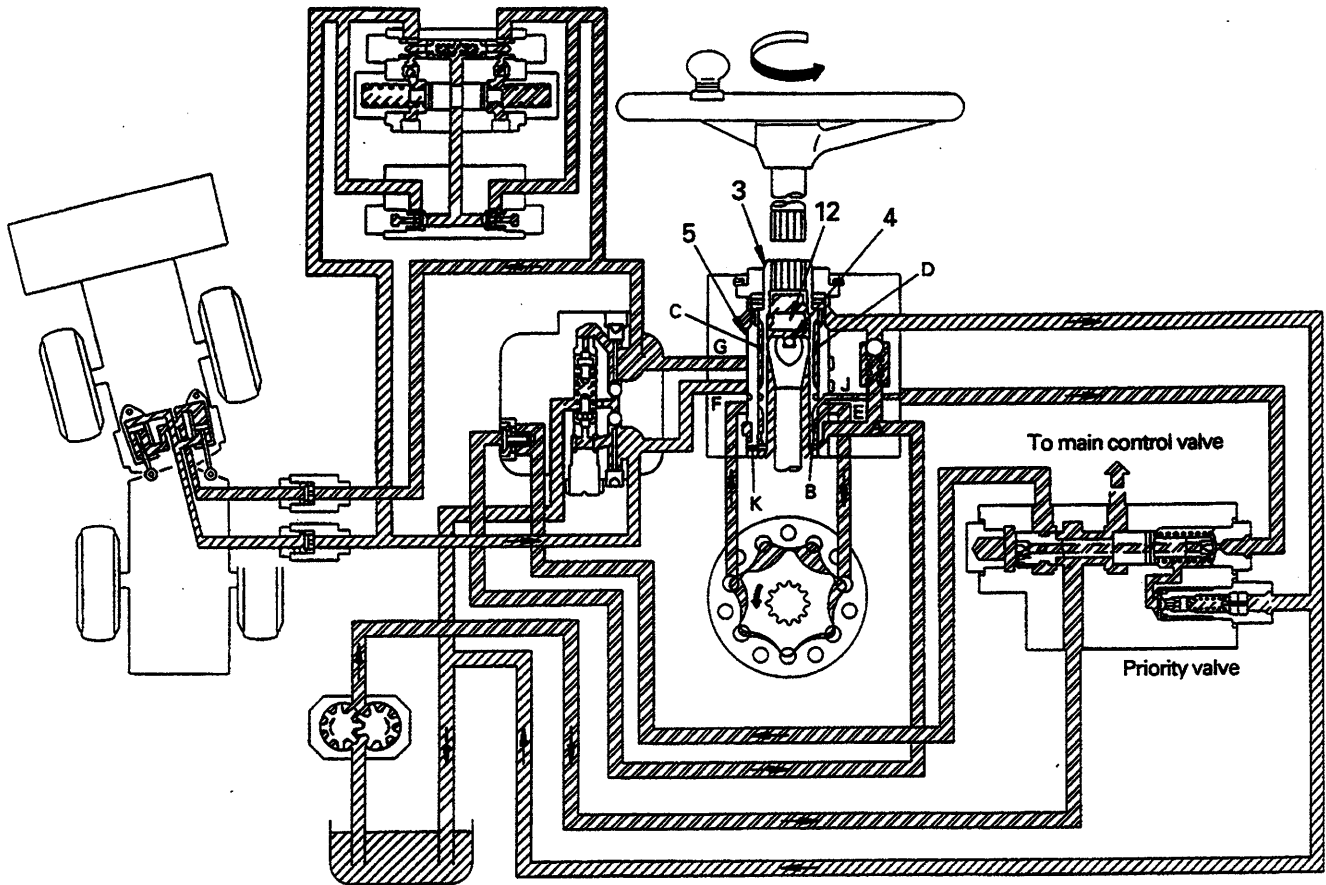
- 1. Front frame
- 2. Rear frame
- 3. Steering cylinder
- 4. Upper hinge pin
- 5. Lower hinge pin

Outline

- The front frame and rear frame are connected by the center hinge pin through a bearing. The steering cylinder is also connected to the left and right front and rear frames, so the angle of articulation of the frame (the turning radius) is adjusted by the movement of the cylinder.

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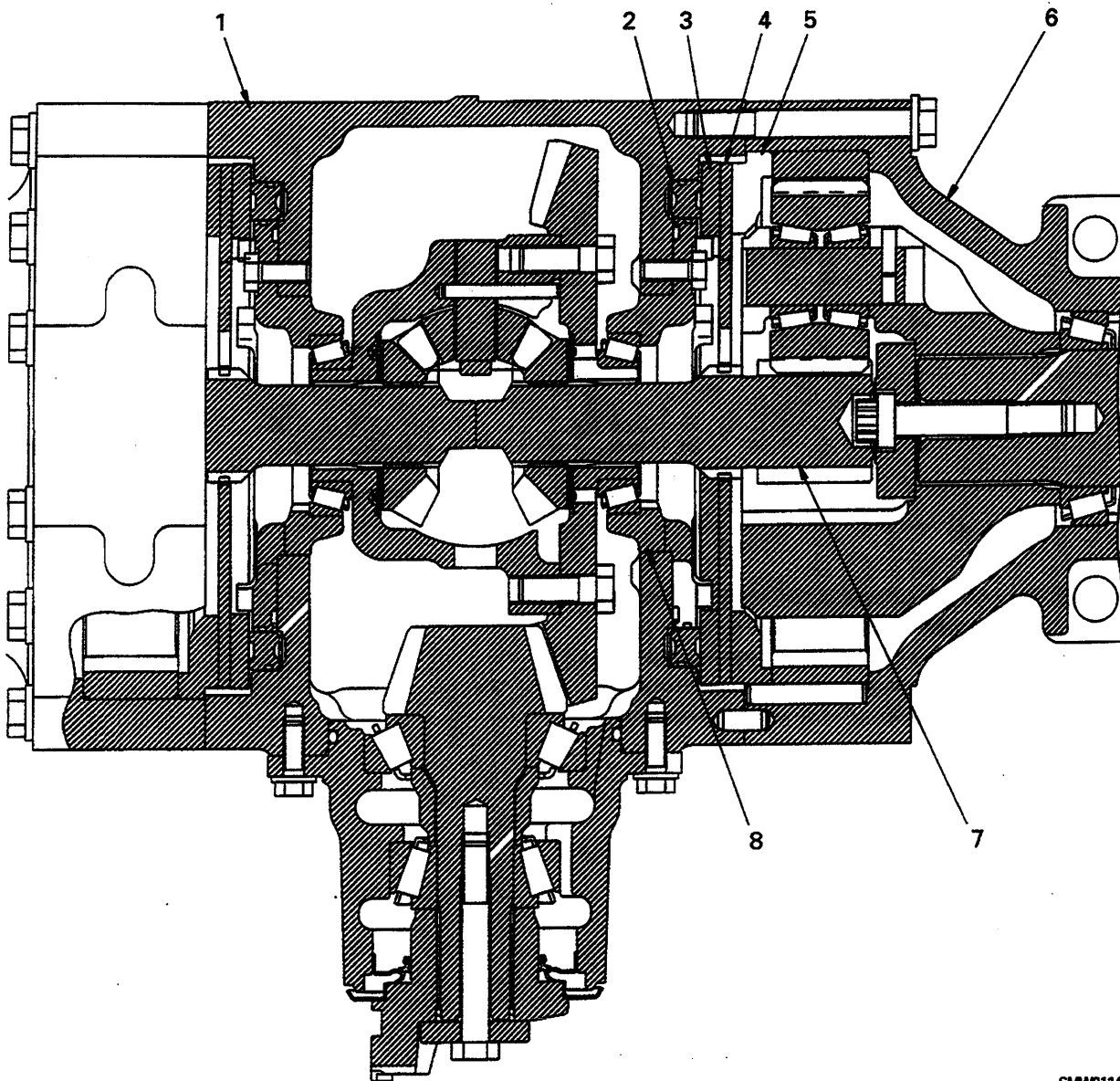
2. Steering wheel turned (turning left)



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BRAKE



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SMW01148

1. Differential housing
2. Piston
3. Inner ring
4. Disc

5. Outer ring
6. Axle housing
7. Sun gear shaft
8. Bearing carrier

Outline

- The brake is a wet type, single disc plate. It consists of piston (2), inner ring (3), disc (4), and outer ring (5).
- The brake cylinder consists of differential housing (1) and bearing carrier (8), with piston (2) assembled in it. Inner ring (3) is installed to the notched por-

- tion of bearing carrier (8). Outer ring (5) is secured to axle housing (6) by a pin.
- There is a lining stuck to both sides of disc (4). The disc is assembled between inner ring (3) and outer ring (5), and is joined to the sun gear shaft by a spline.

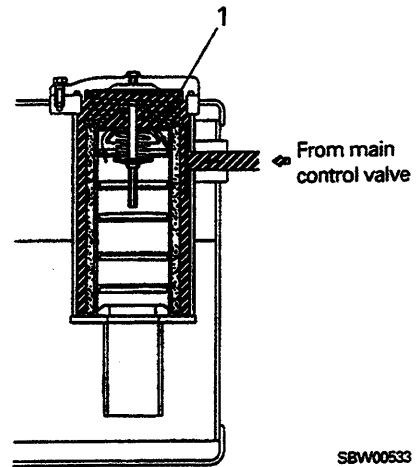
OIL FILTER BYPASS VALVE

When the filter is clogged

Bypass valve (1) opens and the oil returns directly to the tank without passing through the filter.

Bypass valve set pressure:

$0.15 \pm 0.02 \text{ MPa}$ ($1.5 \pm 0.2 \text{ kg/cm}^2$)

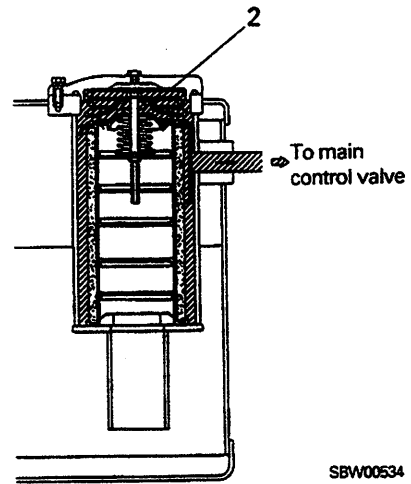


When negative pressure is formed in the return circuit.

Valve (2) moves up and acts check valve.

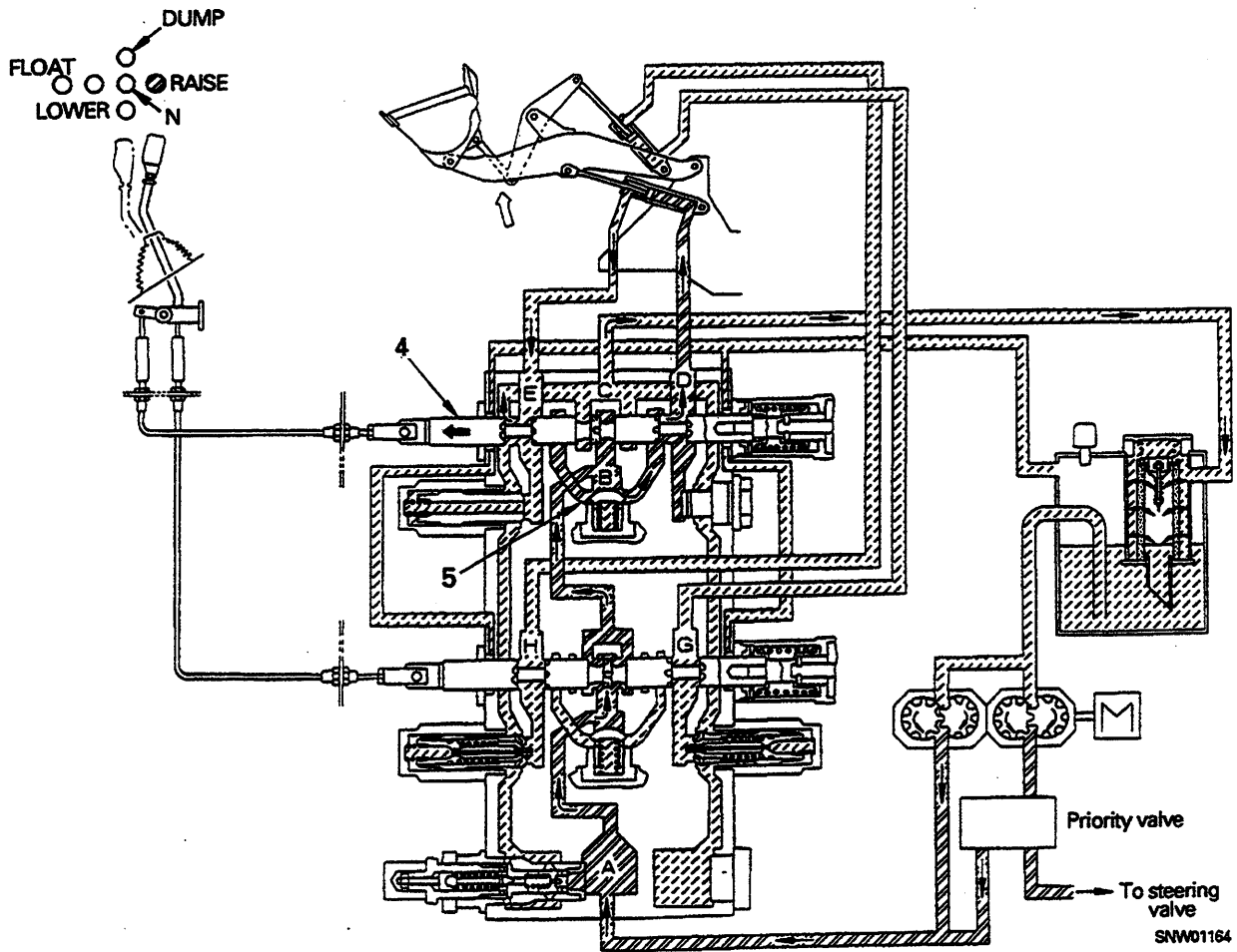
Check valve set pressure:

0.024 MPa (0.24 kg/cm^2)



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Boom spool at RAISE position



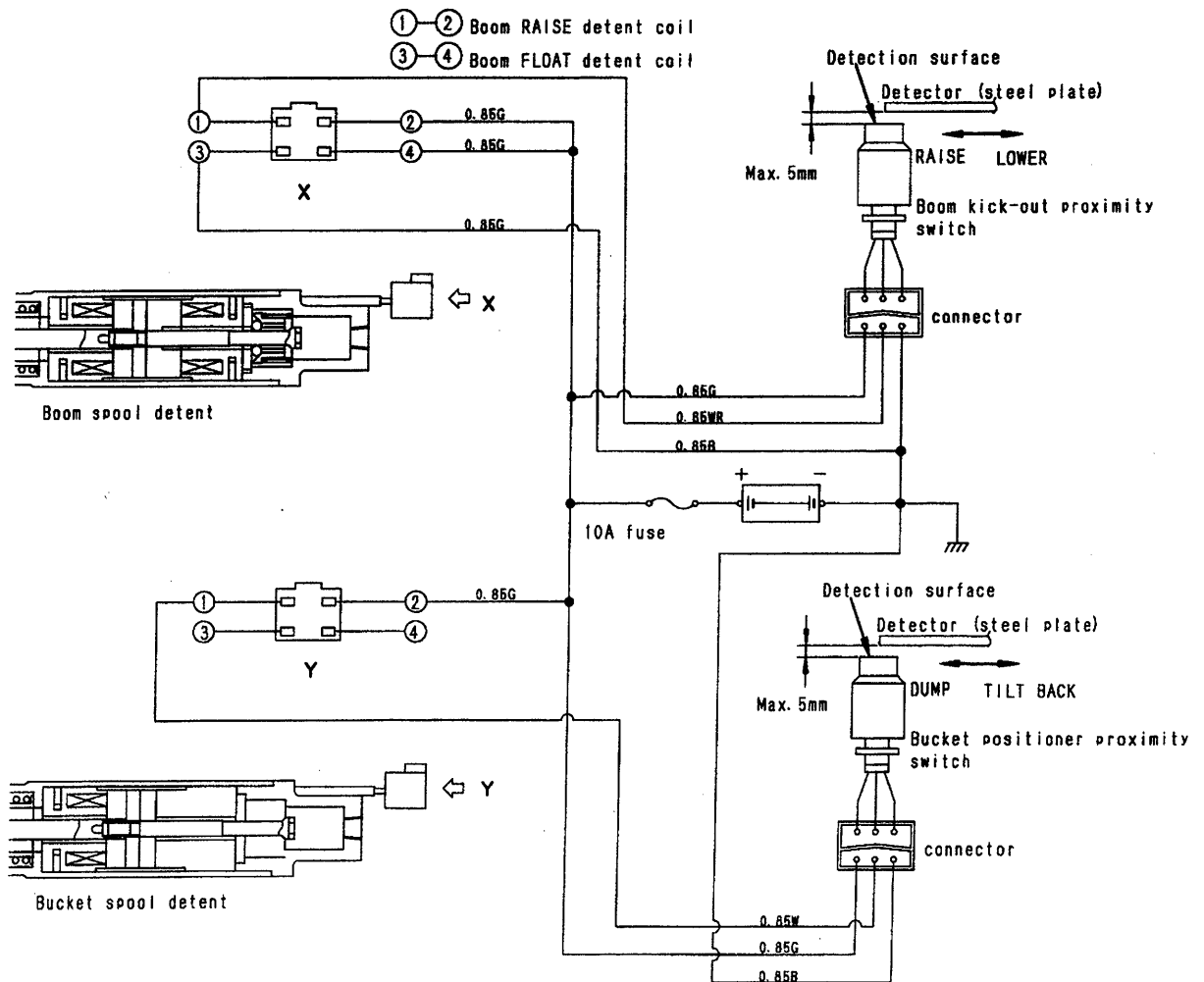
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Operation

- When the work equipment control lever is pulled, boom spool (4) is pulled out to the RAISE position.
- The oil from the pump flows through the bypass circuit of the bucket spool and flows to the bypass circuit of boom spool (4). The bypass circuit is closed by the spool, so the oil from port B pushes check valve (5) open. The oil from port B then flows from port D to the bottom end of the cylinder.
- At the same time, the oil at the cylinder rod end flows from port E to drain port C and returns to the tank. As a result, the boom is raised.














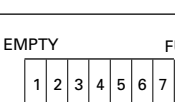

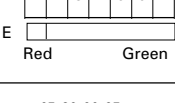

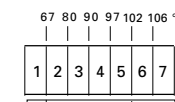
PROXIMITY SWITCH

- The proximity switches are installed to the boom and bucket cylinder by a support. In accordance with the operating condition, a pulse is generated from the sensor at the desired point when moving to the boom RAISE position and bucket TILT BACK position. This electric current is transmitted to a magnet, and the work equipment control levers are returned to neutral. Therefore, the main control valve also returns to neutral and the movement of the boom and bucket is stopped.



SVW03506

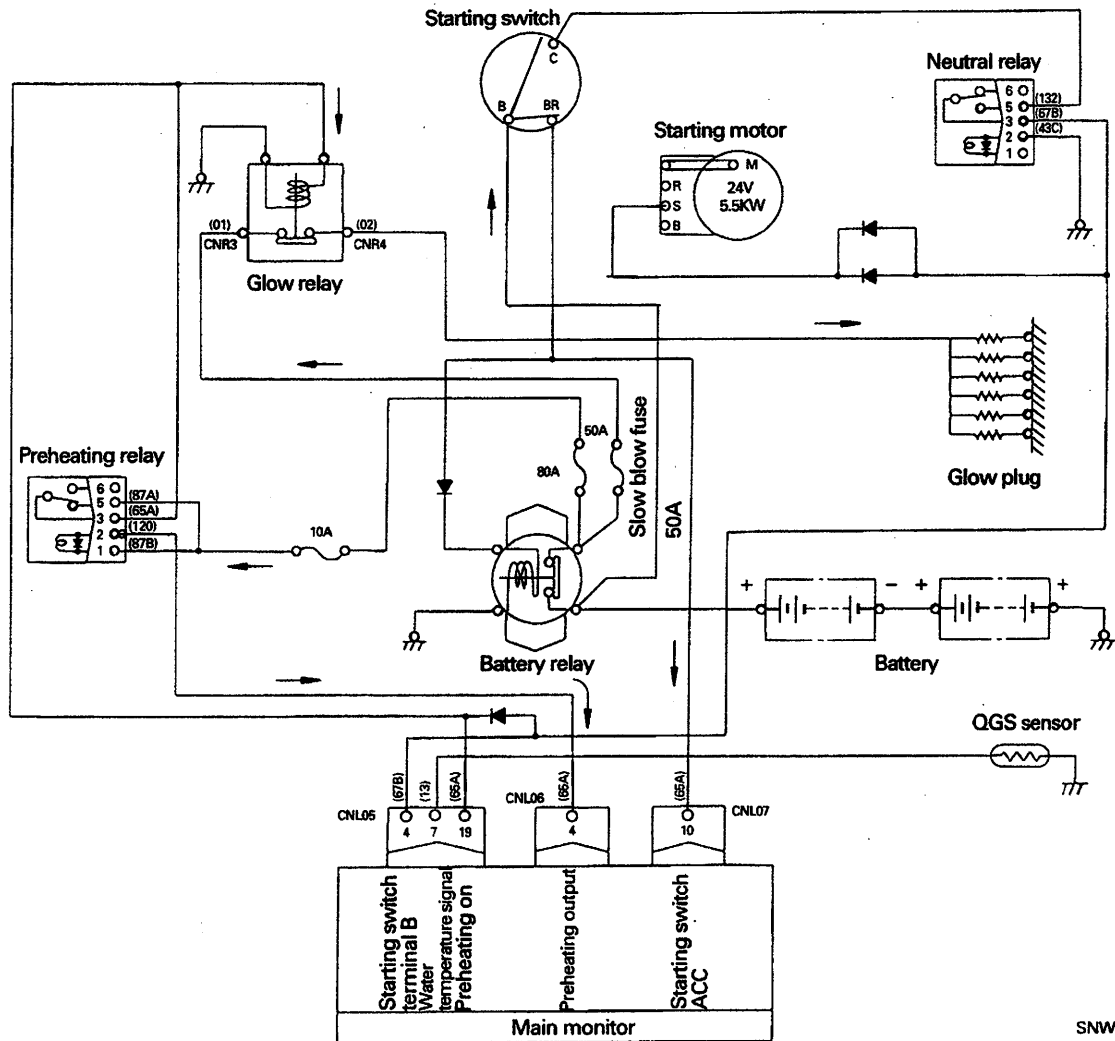
MAINTENANCE MONITOR DISPLAY FUNCTION

Display category	Symbol	Display item	Display range	Display method
Check	 SJW07036	Engine water level	Below low level	Displays when engine is stopped and starting switch is ON Display when normal : OFF Display when abnormal: Flashes CHECK lamp flashes
	 SJW07037	Engine oil level	Below low level	
	 SJW07103	Brake oil level	Below low level	
Caution	 SJW07036	Engine water level	Below low level	Displays when engine is running Display when normal : OFF Display when abnormal: Flashes CAUTION lamp flashes Buzzer sounds
	 SJW07103	Brake oil level	Below low level	
	 SJW07039	Engine oil pressure	Below specified pressure	-----
	 SJW07041	Engine water temperature	Above 102°C	Buzzer sounds if above 105°C
	 SJW07042	Torque converter oil temperature	Above 120°C	Buzzer sounds if above 130°C
	 SJW07043	Fuel level	Below low level	Displays when engine is running Display when normal : OFF Display when abnormal: Flashes CAUTION lamp flashes
	 SJW07044	Battery charge	When charge is defective	Displays when engine is running Display when normal : OFF Display when abnormal: Flashes CHECK lamp flashes
Service meter	 SJW07046	Service meter	0 – 99999.9 h	Actuated when charge is normal Advances 1 for every hour
	 SJW07047	Service meter indicator		Lights up when service meter is running
Gauges	 SJW07043	Fuel level	EMPTY FULL  E F Red Green	All lamps light up below applicable level Flashes when level is 1
	 SJW07041	Engine water temperature	67 80 90 97 102 106 °C  C H White Green Red	One place lights up to show applicable level Flashes when level is 6 or 7
	 SJW07042	Torque converter oil temperature	50 70 90 110 120 130 °C  C H Green Red	One place lights up to show applicable level Flashes when level is 6 or 7

PREHEATING CIRCUIT

Serial No.: 50001-52999

QUICK GLOW SYSTEM (QGS)



SNW01181

Outline

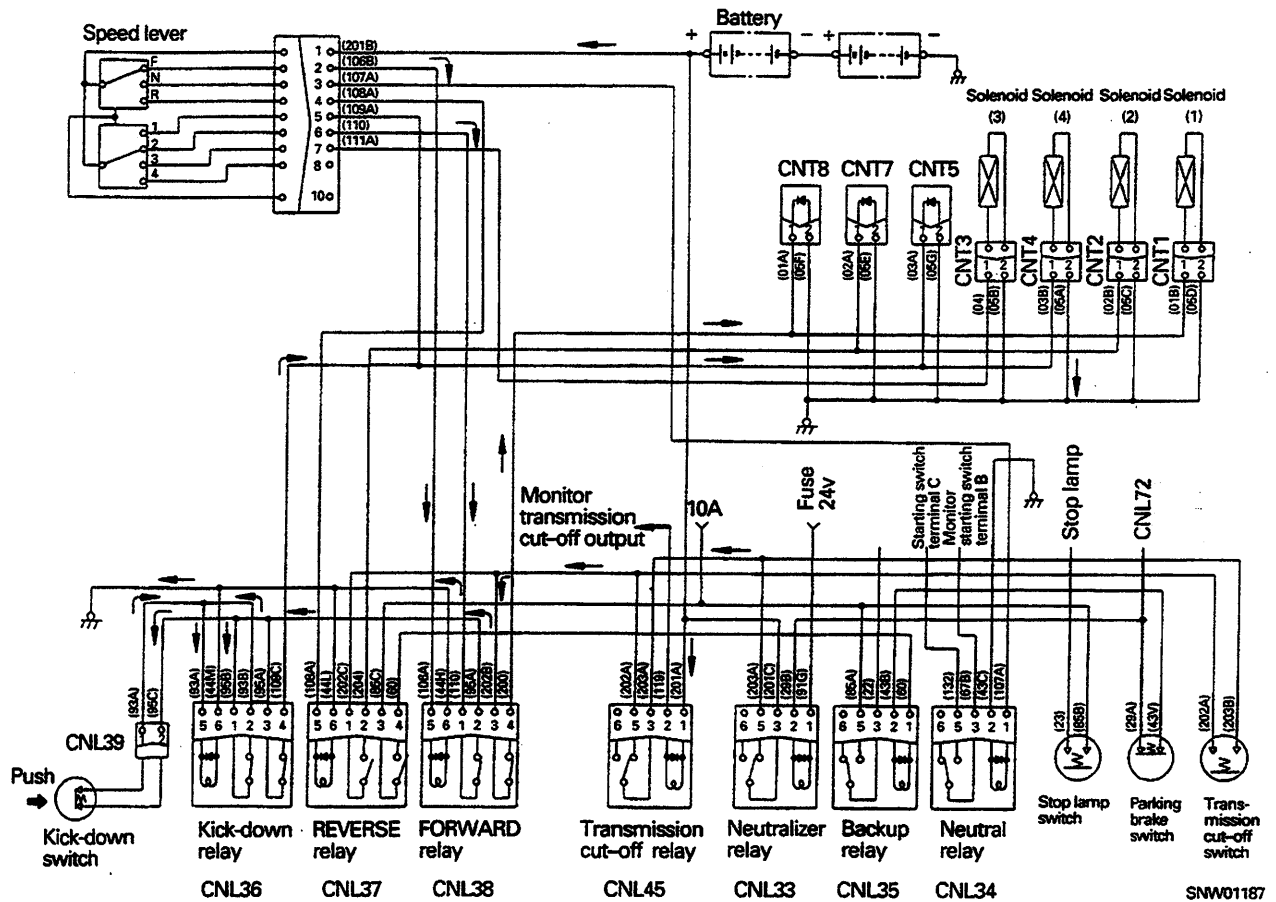
- The quick glow system (QGS) is provided to improve engine starting performance in cold regions. The QGS acts to reduce preheating time, and also sets the preheating time automatically according to the water temperature when the starting switch is operated.
- When the starting switch is turned from OFF to ON (ACC), the preheat pilot lamp on the main monitor panel lights up and the engine is preheated with the glow plug. The preheating time is set by the QGS controller in the main monitor, which detects the water temperature using the QGS water temperature sensor in the engine.
- When the pilot lamp is lighted, the engine is being preheated. Set the starting switch to the ON position. If the starting switch is

turned to the START position, preheating is canceled.

Operation

- When the starting switch is set to the ON (ACC) position, a signal flows from starting switch terminal BR to the controller in the main monitor, and the preheat output is connected to the ground. The preheat relay coil is excited, the preheat relay is activated, and this activates the glow relay. A current flows in the following circuit: Battery → battery relay → glow relay → glow plug. This sets the preheating mode.
- When the signal indicated that preheating is completed is sent from the controller, the preheat relay turns OFF, the glow relay also turns OFF, and preheating is completed.

Kick-down switch operated
 (When operating or traveling in F2)
 (When kick-down switch is pressed ON)



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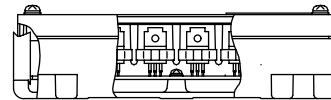
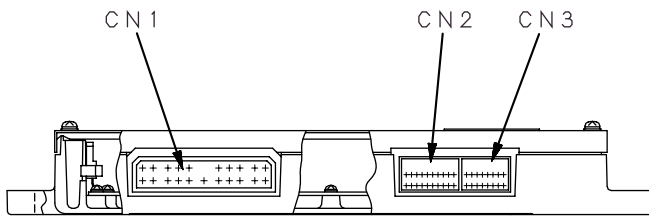
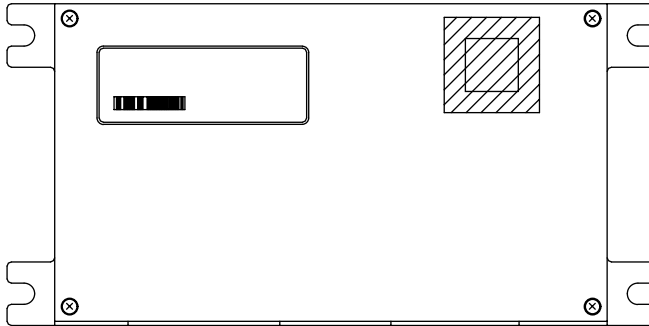
- When the kick-down switch is pressed, electric current flows from the battery ⊕ → speed lever 2 → FORWARD relay terminal 3 - 4 → kick-down switch → kick-down relay terminal 5 - 6 → ground. As a result, the kick-down is actuated, and kick-down relay terminals 1 and 2 and terminals 3 and 4 are closed. A circuit from kick-down relay terminal 1 - 2 → kick-down relay terminal 5 - 6 → ground is formed, so the kick-down relay continues to be actuated even if the kick-down switch is released. (Self-hold circuit of kick-down relay)
- When the kick-down relay is actuated and terminals 3 and 4 are closed, electric current flows from the battery ⊕ → kick-down relay terminal 3 - 4 → solenoid 4 → ground, and solenoid (4) is actuated. Solenoids (1) and (4) are actuated, so the transmission is set to F1.

In this way, if the kick-down switch is pressed when the speed lever is at F2, the transmission will shift to F1. At the same time, it will be held in F1 by the self-hold function of the kick-down relay even when the kick-down switch is released. However many times the kick-down switch is pressed, the transmission will stay in F1.

Solenoid actuation table

Solenoid	F1	F2	F3	F4	N	R1	R2	R3	R4
FORWARD (1)	●	○	○	○					
REVERSE (2)						○	○	○	○
H-L select (3)			○	○				○	○
Speed select (4)	●			○		○			○

TRANSMISSION CONTROLLER



SDW02675

Connector signals

CN1

1	NETWORK signal (To main monitor)
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	Power supply input (+24 V)
9	GND
10	HL, Sol
11	SP, Sol
12	NETWORK signal (To main monitor)
13	Neutralizer relay power supply (+24 V)
14	_____
15	_____
16	_____
17	Sol. power supply input (+24 V)
18	Power supply input (+24 V)
19	GND
20	R, Sol
21	F, Sol

CN2

1	Direction switch, F
2	Range switch, 2
3	Range switch, 4
4	Neutralizer relay signal
5	Manual selector switch
6	Model selector 2
7	Model selector 1
8	Engine selector
9	Signal GND output
10	_____
11	Direction switch, N
12	Direction switch, R
13	Range switch, 1
14	Range switch, 3
15	Tire selector
16	Transmission cut-off switch
17	Kick-down switch
18	Hold switch
19	_____
20	_____

CN3

1	_____
2	_____
3	_____
4	Travel speed signal (+)
5	Engine revolution signal
6	_____
7	_____
8	Manual signal output
9	_____
10	_____
11	_____
12	Travel speed signal (-), Engine revolution signal (-)
13	_____
14	_____
15	Buzzer signal output
16	_____

TOOLS FOR TESTING, ADJUSTING, AND TROUBLESHOOTING

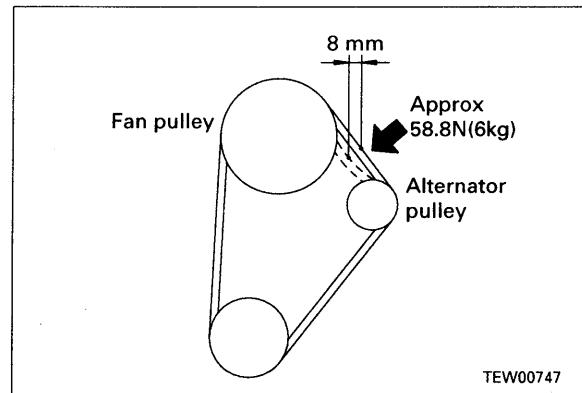
Check or measurement item	Symbol	Part No.	Part Name	Remarks		
Engine speed	A	1	799-203-8001	Multi-tachometer	Kit Part No.: 799-203-9000 Digital display L : 60 – 2,000rpm H : 60 – 19,999rpm	
		2	6142-82-5112	Adapter		—
		3	795-790-2500	Adapter assembly		—
Coolant and oil temperatures	B	799-101-1502	Digital temperature gauge	-99.9 – 1,299°C		
Oil pressure	C	1	799-101-5002	Analog hydraulic tester	Pressure gauge 2.45, 5.88, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm ² }	
			799-261-1203	Digital hydraulic tester	Pressure gauge 0 – 68.6 MPa {0 – 700 kg/cm ² }	
		2	790-401-2320	Hydraulic gauge	Pressure gauge 1.0 MPa {10 kg/cm ² }	
		3	790-261-1311	Adapter	—	
			790-261-1321		—	
Compression pressure	D	1	795-502-1590	Compression gauge	0 – 6.9 MPa {0 – 70 kg/cm ² } Kit Part No.: 799-502-1205	
		2	795-502-1370	Adapter	—	
Blow-by pressure	E	1	799-201-1511	Tool	0 – 4.9 kPa {0 – 500 mmH ₂ O} Kit Part No.: 799-201-1504	
		2	799-201-1541	Gauge		
		3	799-201-1571	Tube		
		4	799-201-1411	Adapter		
		5	799-201-1460	Plug		
		6	799-201-1450	Adapter		
		7	795-790-1950	Nozzle	Diameter of orifice: 5.613 mm	
Valve clearance	F	Commercially available	Feeler gauge	—		
	F1	795-799-1130	Gear	—		
Exhaust color	G	1	799-201-9000	Handy smoke checker	Discoloration 0 – 70 % (with standard color) (Discoloration % x 1/10 ÷ Bosch index)	
		2	Commercially available	Smoke meter		
Operating effort	H	Commercially available	Push-pull scale	—		
Work equipment speed	J	Commercially available	Stop watch	—		
Troubleshooting of wiring harnesses and sensors	K	799-601-7400	T-adapter kit	—		
Stroke, hydraulic drift	L	Commercially available	Scale	—		
Air pressure (Boost pressure)	M	1	799-201-2201	Pressure gauge	-101.3 – 199.9kPa {-760 – 1500mmHg}	
		2	799-301-1490	Nipple	—	

TESTING AND ADJUSTING FAN BELT TENSION

Serial No. 50001 - 52999

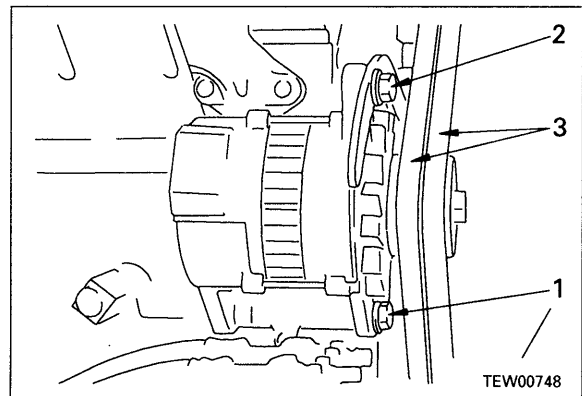
Testing the fan belt tension

1. Apply a force of approximately 98N {10kg} to the fan belt midway between the fan pulley and alternator pulley and check its deflection.



Adjusting the fan belt tension

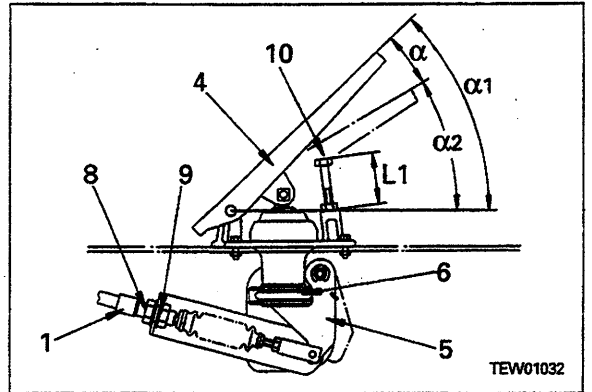
1. Loosen the alternator assembly installation bolt (1) and belt tension adjustment bolt (2).
2. Move the alternator using a pipe, etc., check the belts (3) tension, then first tighten the adjustment nut, then the alternator installation bolt.



OPERATING ANGLE OF ACCELERATOR PEDAL

Measuring

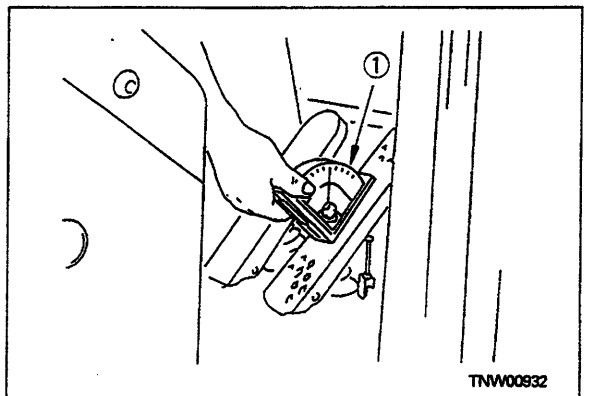
1. Stop the engine.
2. Measure the operating angle when the pedal is operated from the low idling position to the high idling position.
Put angle gauge ① in contact with the accelerator pedal, and measure operating angle α ($\alpha = \alpha_1 - \alpha_2$) when the pedal is operated from low idling position α_1 to high idling position α_2 .



TEW01032

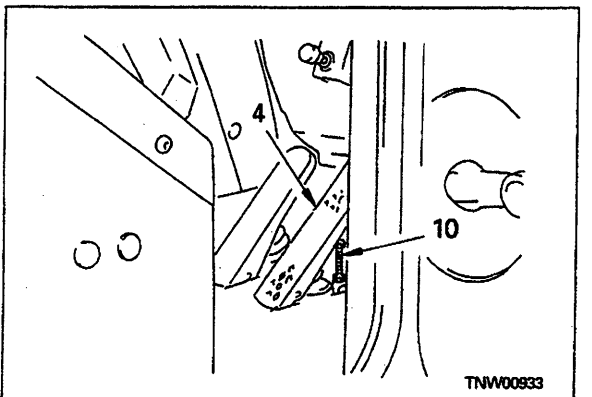
Adjusting

1. Open the inspection cover of the engine hood.
2. Set accelerator pedal (4) at the FREE position (lever (5) is in contact with U-bolt (6)), adjust cable (1) so that governor lever (2) is in the idling position, then tighten nuts (8) and (9).

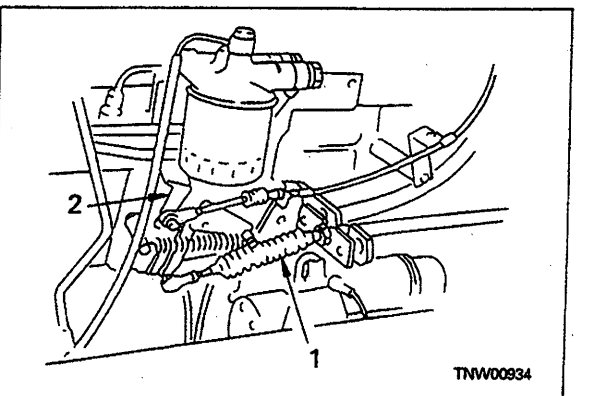


TNW00932

3. Adjust stopper bolt (10) so that governor lever (2) is at the high idling position when accelerator pedal (4) is depressed.



TNW00933

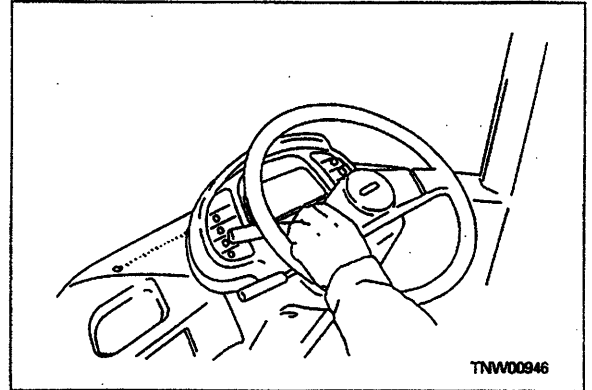


TNW00934

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MEASURING OPERATING TIME FOR STEERING WHEEL**★ Measurement conditions**

- Road surface: Flat, horizontal, dry paved surface
- Engine water temperature: Within green range on engine water temperature gauge
- Hydraulic oil temperature: 45 – 55°C
- Tire inflation pressure: Specified pressure
- Engine speed: Low and high idling

**Measurement method**

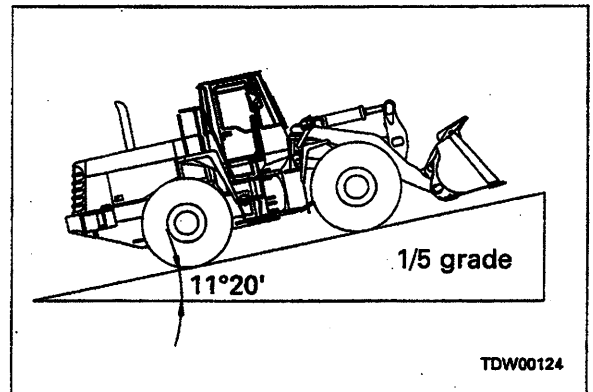
1. Start the engine.
 - ★ After starting the engine, raise the bucket approx. 400 mm and remove the safety bar.
2. Operate the steering wheel to the end of its stroke to turn the machine to the left or right.
3. Measure the time taken to operate the steering wheel to the end of the stroke to the right (left).
 - ★ Operate the steering wheel as quickly as possible without using force.
 - ★ Carry out the measurements both at low idling and high idling, and to both the left and right.

041803

MEASURING PARKING BRAKE PERFORMANCE

★ Measurement conditions

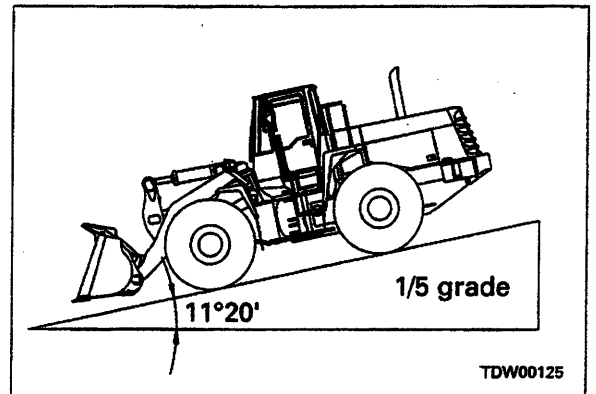
- Tire inflation pressure: Specified pressure
- Road surface: Flat, dry paved road surface with slope of 1/5 grade (11°20').
- Machine: Operating condition
- Operating effort: 392.3 N (40 kg)



Measurement method

1. Start the engine, set the machine facing in a straight line, then drive the machine up a 1/5 grade slope with the bucket empty.
2. Depress the brake, stop the machine, set the directional lever to the neutral position, then stop the engine.
3. Depress the parking brake pedal, then gradually release the brake pedal and check that the machine is held in position.

- ★ Carry out the measurement in two ways: Once with the machine facing uphill, and once more with the machine facing downhill.



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MEASURING WORK EQUIPMENT

★ Measurement conditions

- Engine water temperature: Within green range on engine water temperature gauge
- Hydraulic oil temperature: 45 – 55°C
- Engine speed: High idling
- Steering position: Neutral
- No load

Measurement method

1. Boom RAISE time

Set the bucket at the lowest position from the ground with the bucket tilted back fully, then raise it and measure the time taken for the bucket to reach the maximum boom height.

2. Boom LOWER time

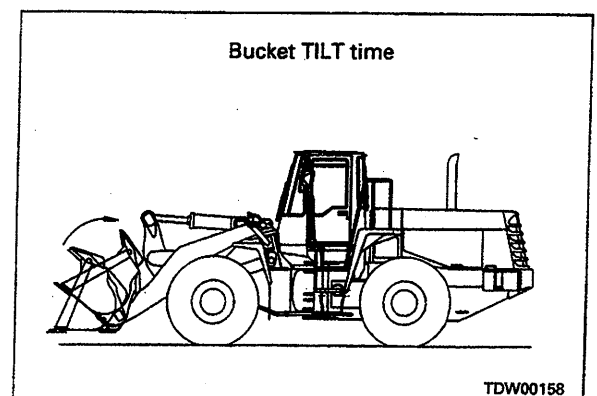
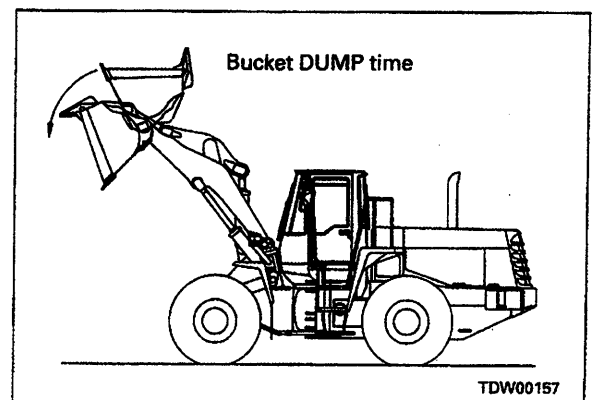
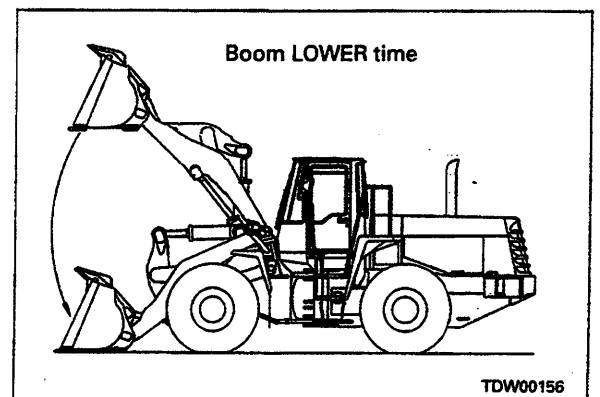
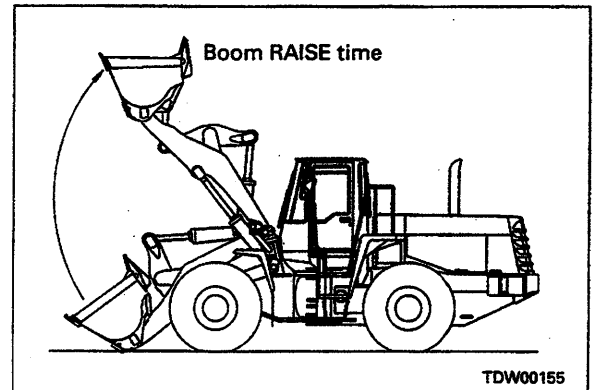
Set the bucket horizontal, then lower the boom from the maximum height and measure the time taken for the bucket to reach the lowest position from the ground.

3. Bucket DUMP time

Raise the boom to the maximum height, and measure the time taken to move the bucket from the tilt position (bucket fully tilted back) to the dump position (bucket fully tipped forward).

4. Bucket TILT time

- 1) Raise the boom to the maximum height, and measure the time taken to move the bucket to the tilt position (bucket fully tilted back).
- 2) Set the bucket horizontal to the ground and measure the time taken to move the bucket from the horizontal position to the tilt position (bucket fully tilted back).



PRECAUTIONS WHEN CARRYING OUT MAINTENANCE

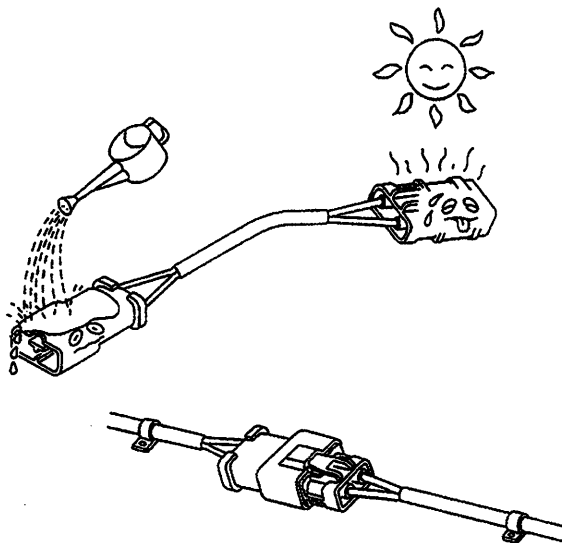
To maintain the performance of the machine over a long period, and to prevent failures or other troubles before they occur, correct operation, maintenance and inspection, troubleshooting, and repairs must be carried out. This section deals particularly with correct repair procedures for mechatronics and is aimed at improving the quality of repairs. For this purpose, it gives sections on "Handling electric equipment" and "Handling hydraulic equipment" (particularly hydraulic oil).

1. PRECAUTIONS WHEN HANDLING ELECTRIC EQUIPMENT

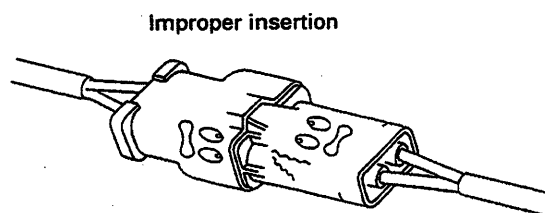
- 1) **Handling wiring harnesses and connectors**
Wiring harnesses consist of wiring connecting one component to another component, connectors used for connecting and disconnecting one wire from another wire, and protector or tubes used for protecting the wiring. Compared with other electrical components fitted in boxes or cases, wiring harnesses are more likely to be affected by the direct effects of rain, water, heat, or vibration. Furthermore, during inspection and repair operations they are frequently removed and installed again, so they are likely to suffer deformation or damage. For this reason, it is necessary to be extremely careful when handling wiring harnesses.

Main failures occurring in wiring harness

- (1) **Defective contact of connectors (defective contact between male and female)**
Problems with defective contact are likely to occur because the male connector is not properly inserted into the female connector, or because one or both of the connectors is deformed or the position is not correctly aligned, or because there is corrosion or oxidization of the contact surfaces.



TEW00191



TEW00192

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METHOD OF USING TROUBLESHOOTING CHARTS

1. Category of troubleshooting code number

Troubleshooting code No.	Component
S-○○	Troubleshooting of engine
M-○○	Troubleshooting of main monitor
K-○○	Troubleshooting of maintenance monitor
E-○○	Troubleshooting of electrical system
T-○○	Troubleshooting of hydraulic and mechanical system
A-○○	Troubleshooting of transmission controller

2. Method of using troubleshooting table for each troubleshooting mode

1) Troubleshooting code number and problem

The title of the troubleshooting chart gives the troubleshooting code, service code, and failure mode (problem with the machine). (See Example (1))

2) Distinguishing conditions

Even with the same failure mode (problem), the method of troubleshooting may differ according to the model, component, or problem. In such cases, the failure mode (problem) is further divided into sections marked with small letters (for example, (a)), so go to the appropriate section to carry out troubleshooting.

If the troubleshooting table is not divided into sections, start troubleshooting from the first check item in the failure mode. (See Example (2))

3) Method of following troubleshooting chart

- Check or measure the item inside

	YES NO
--	-----------

, and according to the answer follow either the YES line or the NO line to go to the next

--

. (Note: The number written at the top right corner of the

--

 is an index number; it does not indicate the order to follow.)

- Following the YES or NO lines according to the results of the check or measurement will lead finally to the Cause column. Check the cause and take the action given in the Remedy column on the right. (See Example (3))

- Below the [] there are the methods for inspection or measurement, and the judgement values.

If the judgement values below the

--

 are correct or the answer to the question inside the

--

 is YES, follow the YES line; if the judgement value is not correct, or the answer to the question is NO, follow the NO line.

- Below the

--

 is given the preparatory work needed for inspection and measurement, and the judgement values. If this preparatory work is neglected, or the method of operation or handling is mistaken, there is danger that it may cause mistaken judgement, or the equipment may be damaged. Therefore, before starting inspection or measurement, always read the instructions carefully, and start the work in order from Item 1).

4) General precautions

When carrying out troubleshooting for the failure mode (problem), precautions that apply to all items are given at the top of the page and marked with ★. (See Example (4))

The precautions marked ★ are not given in the

--

, but must always be followed when carrying out the check inside the

--

.

5) Troubleshooting tools

When carrying out the troubleshooting, prepare the necessary troubleshooting tools. For details, see TOOLS FOR TESTING, ADJUSTING, AND TROUBLESHOOTING.

6) Installation position, pin number

A diagram or chart is given for the connector type, installation position, and connector pin number connection. When carrying out troubleshooting, see this chart for details of the connector pin number and location for inspection and measurement of the wiring connector number appearing in the troubleshooting flow chart for each failure mode (problem).

CONNECTOR TYPES AND MOUNTING LOCATIONS

Serial No. 53001 and up

★ The Address column in the table above shows the address in the connector pin arrangement diagram (3-dimensional drawing).

★ Figures are indicated in () for the connectors marked * in the table below.

Con- nector No.	Type	No. of pins	Mounting location	Add- ress	Con- nector No.	Type	No. of pins	Mounting location	Add- ress
CNE4	—	1	QHS water temperature sensor	N5	*CNL41(12)	—	5	Preheating relay	C8
CNE7,8	—	—	Engine stop solenoid	L8	*CNL42(11)	—	5	Horn relay	B7
CNE9	—	1	GND (rear frame)	M5	*CNL45(10)	—	5	Transmission cut-off relay	B7
CNE13	X	2	Starting motor	M4	*CNL64(13)	—	5	Engine stop relay	C9
CNER2	SWP	14	Intermediate connector	K4	CNL72	—	2	Neutralizer diode	C7
CNER3	X	4	Intermediate connector	K4	CNLR2	SWP	14	Intermediate connector (bottom right of floor)	I3
CNFS1	L	2	Fuse box	J9	CNLR3(LR3)	L	2	Intermediate connector (bottom right of floor)	H2
CNFS2	S	12	Fuse box	J9	CNLR4(LR4)	L	2	Intermediate connector (bottom right of floor)	H9
CNFS3	M	6	Fuse box	I9	CNLR5	S	10	Intermediate connector	I2
CNFT1	SWP	14	Intermediate connector (to transmission)	I3	CNLR7(7)	X	4	Intermediate connector (bottom right of floor)	I2
CNL04	SWP	14	Transmission combination switch	G9	CNR1	—	2	Diode (from starting switch terminal BR)	I9
CNL05	AMP 040	20	Main monitor	E8	CNR3	—	1	Heater relay	M7
CNL06	AMP 040	16	Main monitor	F8	CNR4	—	1	Heater relay	L4
CNL07	AMP 040	12	Main monitor	F8	CNR5	—	1	Slow-blow fuse (80A)	M8
CNL08	AMP 040	8	Main monitor	E7	CNR6	—	1	Slow-blow fuse (120A)	M8
CNL09	M	4	Starting switch	G8	CNR7	M	3	Battery relay	L4
CNL13	Single-pin connector	1	Parking brake switch	G1	CNR9	X	2	Heater relay	K9
CNL15	—	2	4th diode	D7	CNR11	—	2	Diode (to safety relay terminal S)	H9
CNL16	—	2	4th diode	D7	*CNT1(1)	X	2	FWD solenoid	J3
CNL26	Single-pin connector	1	Transmission cut-off switch	H2	*CNT2(2)	X	2	REV solenoid	J3
CNL27	Single-pin connector	1	Transmission cut-off switch	G1	*CNT3(3)	X	2	Hi-Lo solenoid	K3
CNL28	Single-pin connector	1	Parking brake switch	C6	*CNT4(4)	X	2	SPEED solenoid	J3
*CNL33(3)	—	5	Neutralizer relay	B9					
*CNL34(2)	—	5	Neutral relay	A9					
*CNL35(1)	—	5	Backup relay	A9					
*CNL36(6)	—	6	Kickdown relay	C8					
*CNL37(7)	—	6	REVERSE relay	C8					
*CNL38(8)	—	6	FORWARD relay	B9					
CNL39	M	2	Kickdown switch	G9					

TROUBLESHOOTING OF ENGINE (S6D95L) SYSTEM (S MODE)

Serial No. 50001 – 52999

S- 1	Starting performance is poor (Starting always takes time)	20-140
S- 2	Engine does not start	20-141
	(1) Engine does not turn	20-141
	(2) Engine turns but no exhaust gas comes out (Fuel is not being injected)	20-142
	(3) Exhaust gas comes out but engine does not start (Fuel is being injected)	20-143
S- 3	Engine does not pick up smoothly (Follow-up is poor)	20-144
S- 4	Engine stops during operations	20-145
S- 5	Engine does not rotate smoothly (hunting)	20-146
S- 6	Engine lacks output (no power)	20-147
S- 7	Exhaust gas is black (incomplete combustion)	20-148
S- 8	Oil consumption is excessive (or exhaust gas is blue)	20-149
S- 9	Oil becomes contaminated quickly	20-150
S-10	Fuel consumption is excessive	20-151
S-11	Oil is in cooling water, or water spurts back, or water level goes down	20-152
S-12	Oil pressure lamp lights up (drop in oil pressure)	20-153
S-13	Oil level rises	20-154
S-14	Water temperature becomes too high (overheating)	20-155
S-15	Abnormal noise is made	20-156
S-16	Vibration is excessive	20-157

S-8 Oil consumption is excessive (or exhaust gas is blue)

★ Do not run the engine at idling for more than 20 minutes continuously. (Both low and high idling)

General causes why oil consumption is excessive

- Abnormal combustion of oil
- External leakage of oil
- Wear of lubrication system

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		Causes													
		Broken piston ring	Worn piston ring	Clogged breather or breather liner	Leakage from oil filter, oil cooler	Leakage from oil piping	Leakage from oil drain plug	Broken oil pan, cylinder head, etc.	Worn seal at turbine end	Worn seal at blower end	Worn, broken rear seal, seal surface	Dust sucked in from intake system	Worn valve (stem, guide), broken seal	Turbocharger	
Questions	Confirm recent repair history														
	Degree of use	Operated for long period								△	△			△	
	Oil consumption suddenly increased								○						
	Engine oil must be added more frequently								○						
	Engine oil becomes contaminated quickly								○	○					
	Exhaust gas is blue under light load														
	Amount of blow-by gas	Abnormally excessive										○			○
		None										○			
	Area around engine is dirty with oil				○	○	○								
	There is oil in engine cooling water									○					
Check items	When exhaust pipe is removed, inside is found to be dirty with oil									○				○	
	Inside of turbocharger intake pipe is dirty with oil										○				
	Oil level in clutch or TORQFLOW transmission damper chamber rises											○			
	Clamps for intake system are loose												○		
Troubleshooting	When compression pressure is measured, it is found to be low	●	●												
	When breather element is inspected, it is found to be clogged with dirty oil			●											
	There is external leakage of oil from engine				●	●	●	●							
	Pressure-tightness test of oil cooler shows there is leakage								●						
	Excessive play of turbocharger shaft									●	●				
	Check rear seal directly											●			
	When intake manifold is removed, dust is found inside												●		
When intake manifold is removed, inside is found to be dirty with oil													●		
Remedy	Replace	Replace	Clean	Repair	Repair	Repair	Replace	Replace	Replace	Repair	Repair	Repair	Repair		

S-9 Oil becomes contaminated quickly

General causes why oil becomes contaminated quickly

- Intake of exhaust gas due to internal wear
- Clogging of lubrication passage
- Improper combustion
- Improper oil used
- Operation under excessive load

Causes	
Worn piston ring, cylinder	
Clogged breather, breather tube	
Clogged oil filter	
Worn valve, valve guide	
Clogged oil cooler	
Clogged turbocharger drain pipe	
Defective seal at turbocharger turbine end	
Defective safety valve	
Exhaust gas is black	

Legend

- : Possible causes (judging from Questions and check items)
- ◎ : Most probable causes (judging from Questions and Check items)
- △ : Possible causes due to length of use (used for a long period)
- : Items to confirm the cause.

Question												
			Worn piston ring, cylinder	Clogged breather, breather tube	Clogged oil filter	Worn valve, valve guide	Clogged oil cooler	Clogged turbocharger drain pipe	Defective seal at turbocharger turbine end	Defective safety valve	Exhaust gas is black	
Confirm recent repair history												
Degree of use	Operated for long period		△		△			△				
Engine oil must be added more frequently			◎									
Non-specified fuel has been used				○								
Color of exhaust gas	Blue under light load		◎									
	Black										◎	
Amount of blow-by gas	Abnormally excessive		◎		○		○	○				
	None		○									
Oil filter caution lamp stays on even when oil pressure rises				◎					○			
When oil filter is inspected, metal particles are found			○	◎	○							
When exhaust pipe is removed, inside is found to be dirty with oil					◎							
Engine oil temperature rises quickly						◎						
Troubleshooting	When compression pressure is measured, it is found to be low		●			●						
	When breather element is inspected directly, it is found to be clogged with dirty oil, or hose is broken			●								
	When oil filter is inspected directly, it is found to be clogged				●							
	When oil cooler is inspected directly, it is found to be clogged						●					
	Turbocharger drain tube is clogged							●				
	Excessive play of turbocharger shaft								●			
	When safety valve is directly inspected, spring is found to be catching or broken									●		
		Remedy		Replace	Clean	Replace	Replace	Clean	Clean	Repalce	Repalce	-

Carry out troubleshooting for "Exhaust is black"

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Transmission				Accumulator valve
k	l	m	n	
△	△	△	△	
X	X	X	X	
		○		
○	○	○	○	
○	○			
○	○	○		
○	○	○	○	
	○	○		

Excessive leakage of oil from transmission clutch shaft seal portion (worn, broken)
 Defective operation inside transmission clutch (seized, worn, oil leakage, broken)
 Breakage inside transmission (bearing, gear, housing)
 Breakage inside accumulator valve (abnormal wear of spool portion)

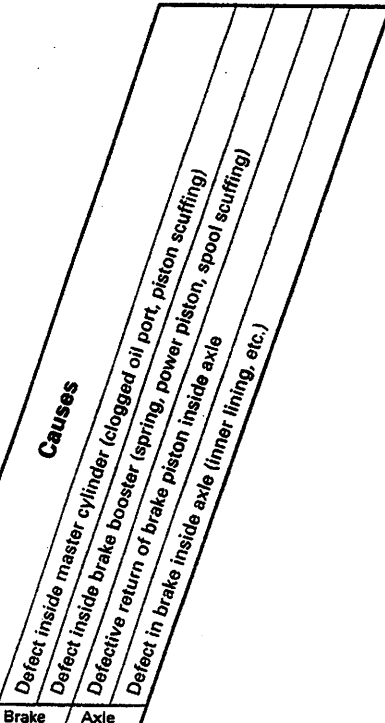
T-11 Brake is not released, brake drags

Checks before troubleshooting

- Is the play of the brake pedal correct?

Checking for abnormalities

- Does the machine travel smoothly under inertia on flat ground?
- Jack up the four wheels and check the rotating resistance of the tires.



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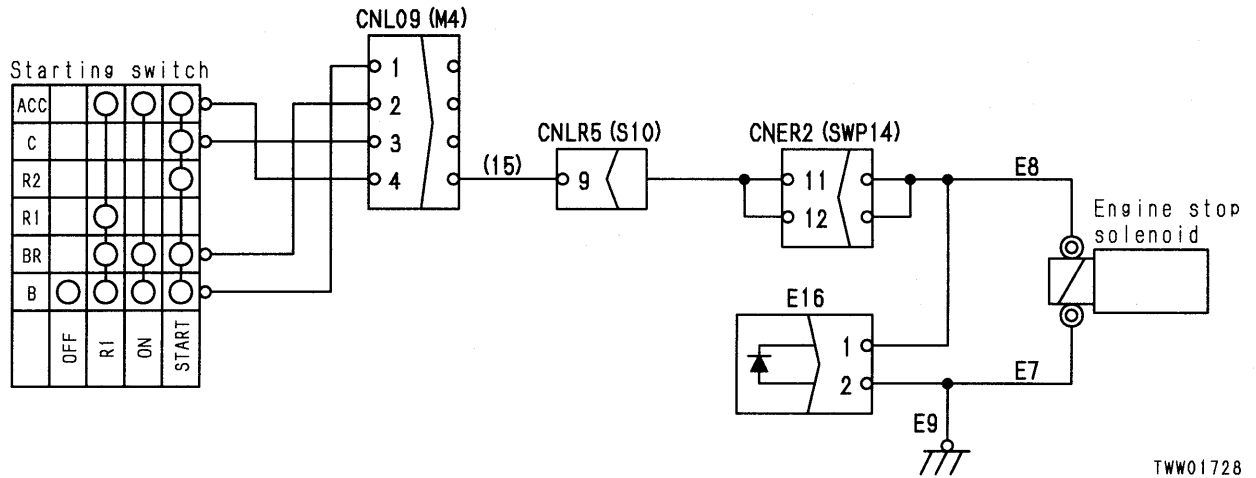
No.	Problems	Remedy			
		Brake booster		Axle brake	
		a	b	c	d
		△	△	△	△
		×	×	×	×
1	When oil is drained from air bleed plug in brakes fluid high pressure circuit, circuit pressure drops and brake is released	○	○		
2	When four wheels are jacked up, axles are put on stands, engine is stopped, parking brake is released, and tires are rotated by hand, certain wheels are heavy			○	○
3	When four wheels are jacked up, axles are put on stands, engine is stopped, parking brake is released, transmission is set to neutral, and tires are rotated by hand, wheels rotate smoothly, but become heavy when engine is started.		○		

TROUBLESHOOTING OF ELECTRICAL SYSTEM FOR ENGINE, TRANSMISSION (E MODE)

E- 1	Engine does not start	20-182
(a)	Starting motor does not turn	20-182
1)	Check starting circuit	20-182
2)	Check between battery Relay and starting switch	20-183
(b)	Starting motor turns	20-184
E- 2	Engine does not stop	20-186
E- 3	Engine stops when machine is travelling	20-186-1
E- 4	Transmission is not set to neutral when parking brake is applied (transmissions cut-off is normal)	20-187
E- 5	Transmission does not work normally	20-188
(a)	Problem in parking brake, transmissions cut-off switch, neutralizer Relay circuit	20-190
(b)	Defective continuity in FORWARD solenoid circuit	20-192
(c)	Defective continuity in REVERSE solenoid circuit	20-194
(d)	Contact in directional circuit	20-196
1)	F is continuous	20-196
2)	R is continuous	20-198
(e)	Problem with speed solenoid, or always stays in 2nd	20-200
(f)	Contact in speed circuit	20-202
1)	Battery voltage formed in 1st (speed) solenoid	20-202
2)	Battery voltage formed in 3rd (H-L) solenoid	20-204
E- 6	Kick-down switch does not work (usual F1 - F4 shifts normally)	20-206
E- 7	Kick-down is actuated only when kick-down switch is ON (self-hold function of kick-down switch Relay does not work)	20-208
E- 8	Kick-down is not canceled	20-209
(a)	Kick-down is not canceled when directional lever is moved from FORWARD to neutral or REVERSE	20-209
(b)	Kick-down is not canceled when speed lever is moved from 2nd to other speed Range (shifts to 4th)	20-210
E- 9	Kick-down switch is wrongly actuated when travelling in F2	20-212
E-10	Preheating is not carried out	20-214
E-11	Preheating Remains actuated	20-216

E-2. Related electric circuit diagram

Serial No. 53001 and up

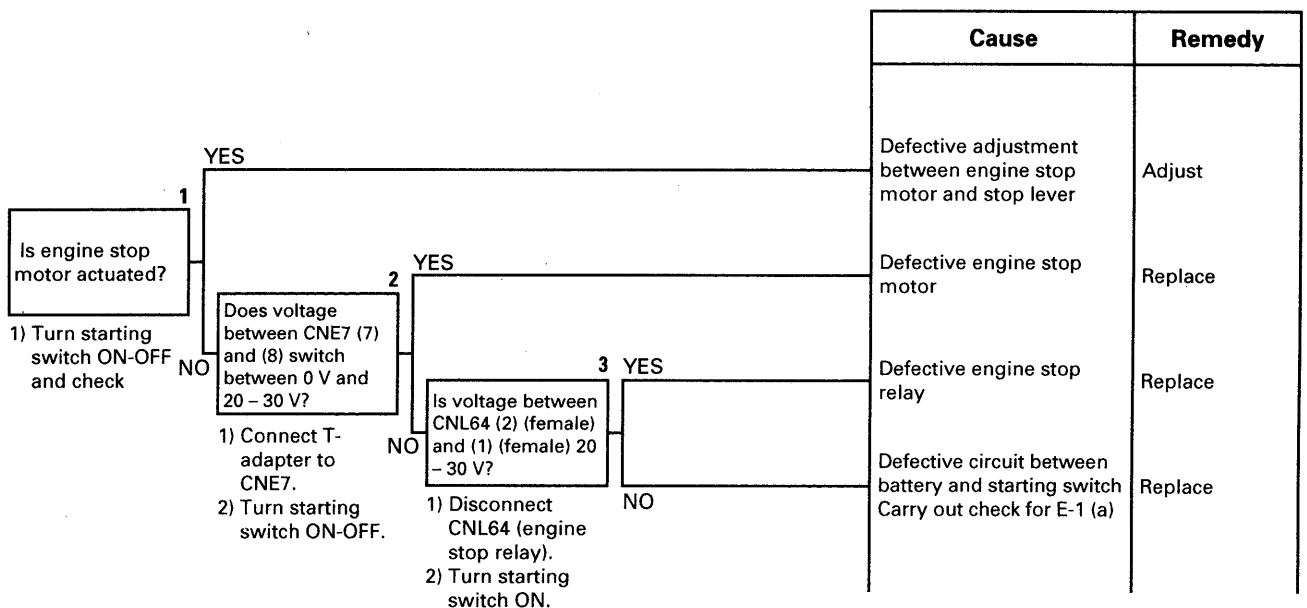


TWW01728

E-3 Engine stops when machine is traveling

Serial No. 50001 – 52999

- ★ Check if starting motor turns. If it does not turn, carry out Troubleshooting E-1 (a) (Engine does not start)



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Cause	Remedy
Defective insulation between CNT1 (1) (male) and connector body, or abnormal contact of chassis ground with wiring harness of CNT1 (1) inside control valve	After inspection, repair or replace
Abnormal contact of chassis ground with wiring harness between CNT1 (female) – CNFT1 (1) (male)	After inspection, repair or replace
Abnormal contact of wiring harness between CNFT1 (5) (male) – CNT1 (2) – CNT2 (2) – CNT3 (2) – CNT4 (2) with wiring harness between CNFT1 (1) (male) – CNT1 (1), CNFT1 (2) (male) – CNT2 (1), CNFT1 (3) (male) – CNT3 (1), CNFT1 (4) (male) – CNT4 (1)	After inspection, repair or replace
Abnormal contact of chassis ground with wiring harness between CNFT1 (1) (female) and CNL38 (4) (female)	After inspection, repair or replace
Defective transmission control switch	Replace
Abnormal contact of chassis or ground with wiring harness between CNL04 (2) – CNL38 (5) – CNL08 (7)	After inspection, repair or replace
Defective FORWARD solenoid relay, or defective contact or disconnection in wiring harness between CNL38 (6) (female) and chassis ground	After inspection, repair or replace

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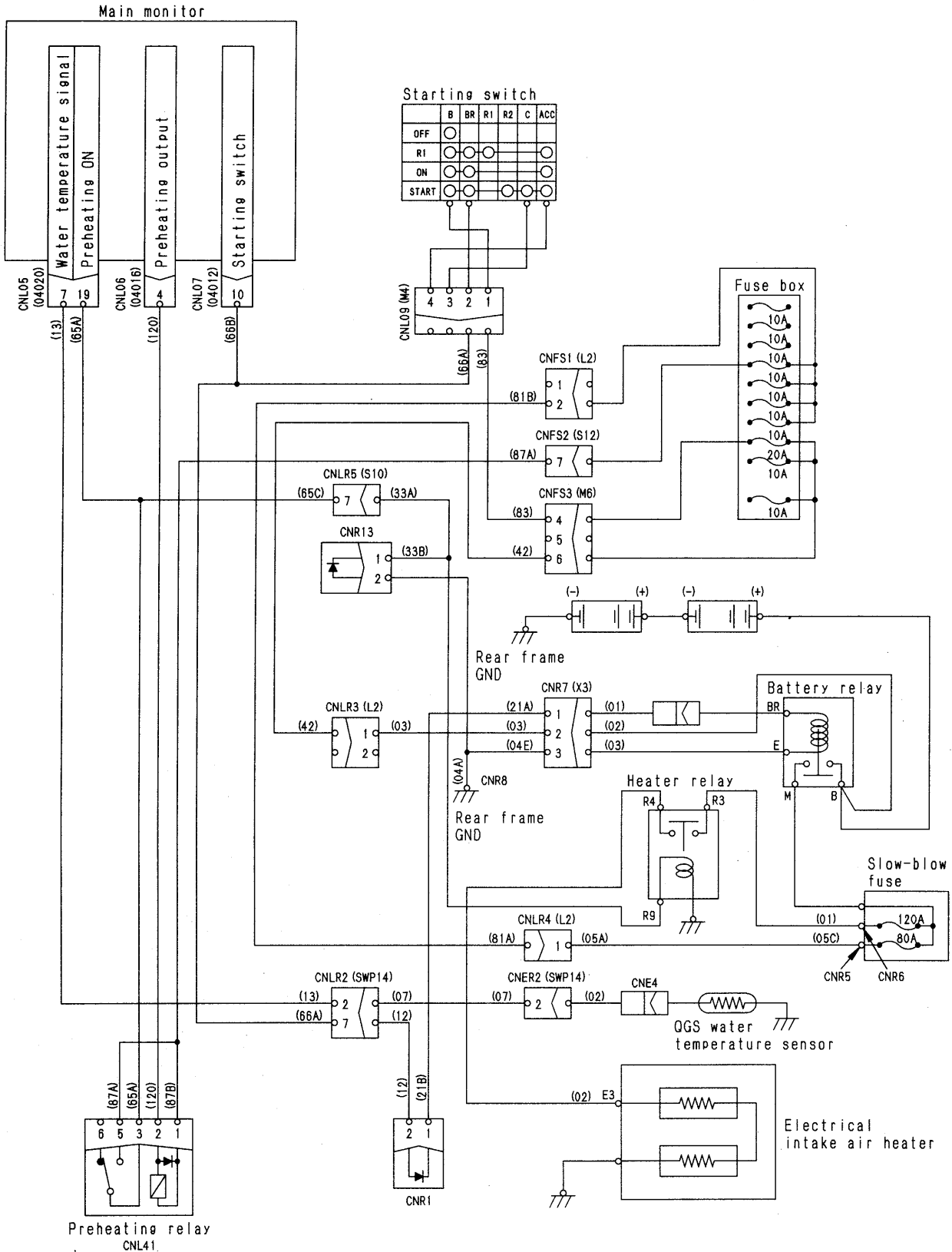
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		Cause	Remedy
		Defective kick-down relay	Replace
		Defective FORWARD solenoid relay	Replace
<p>7</p> <p>Is voltage between CNL38 (1) (female) and chassis 20 – 30 V?</p> <p>1) Disconnect CNL38. 2) Speed lever: 2nd 3) Turn starting switch OFF.</p>	<p>YES</p> <p>8 YES</p> <p>Is there continuity between CNL36 (3) (female) and CNL38 (2) (female)?</p>	<p>After inspection, repair or replace</p>	
	<p>NO</p> <p>9 YES</p> <p>Is voltage between CNL04 (6) and chassis 20 – 30 V?</p> <p>1) Turn starting switch OFF. 2) Connect T-adapter to CNL04. 3) Speed lever: 2nd 4) Turn starting switch ON.</p>	<p>NO</p> <p>1) Disconnect CNL36 and CNL38. 2) Turn starting switch ON.</p>	<p>After inspection, repair or replace</p>
		Defective speed lever	Replace
		Defective contact or disconnection in wiring harness between CNL36 (3) and CNL38 (2)	After inspection, repair or replace
		Defective contact or disconnection in wiring harness between CNL36 (5) – CNL39 (1) – CN435 (4)	After inspection, repair or replace
		Defective contact or disconnection in wiring harness between CNL36 (6) and chassis ground	After inspection, repair or replace
		Defective kick-down switch	Replace

E-10. a) Related electric circuit diagram

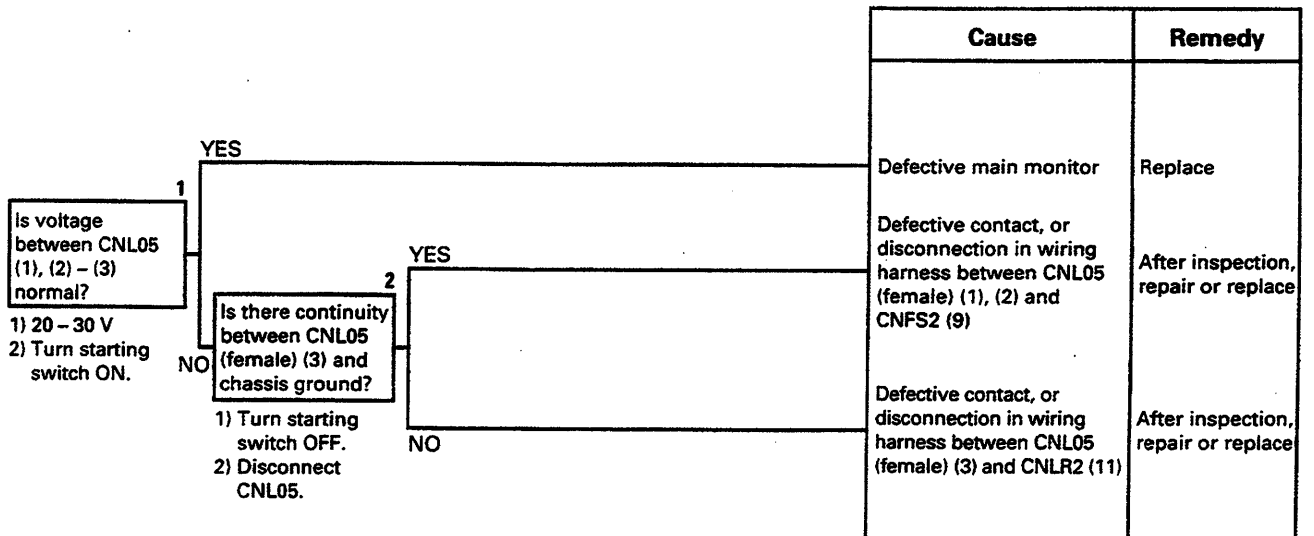
Serial No. 53001 and up



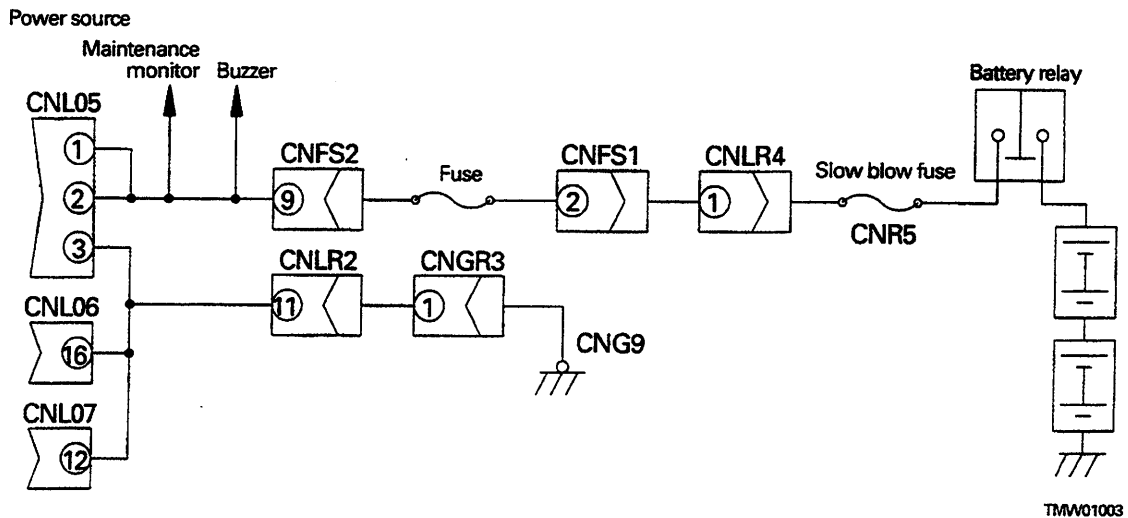
TWW01729

M-1 Main monitor does not work

- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on the next step.



041803



M-8 Abnormality in preheating system

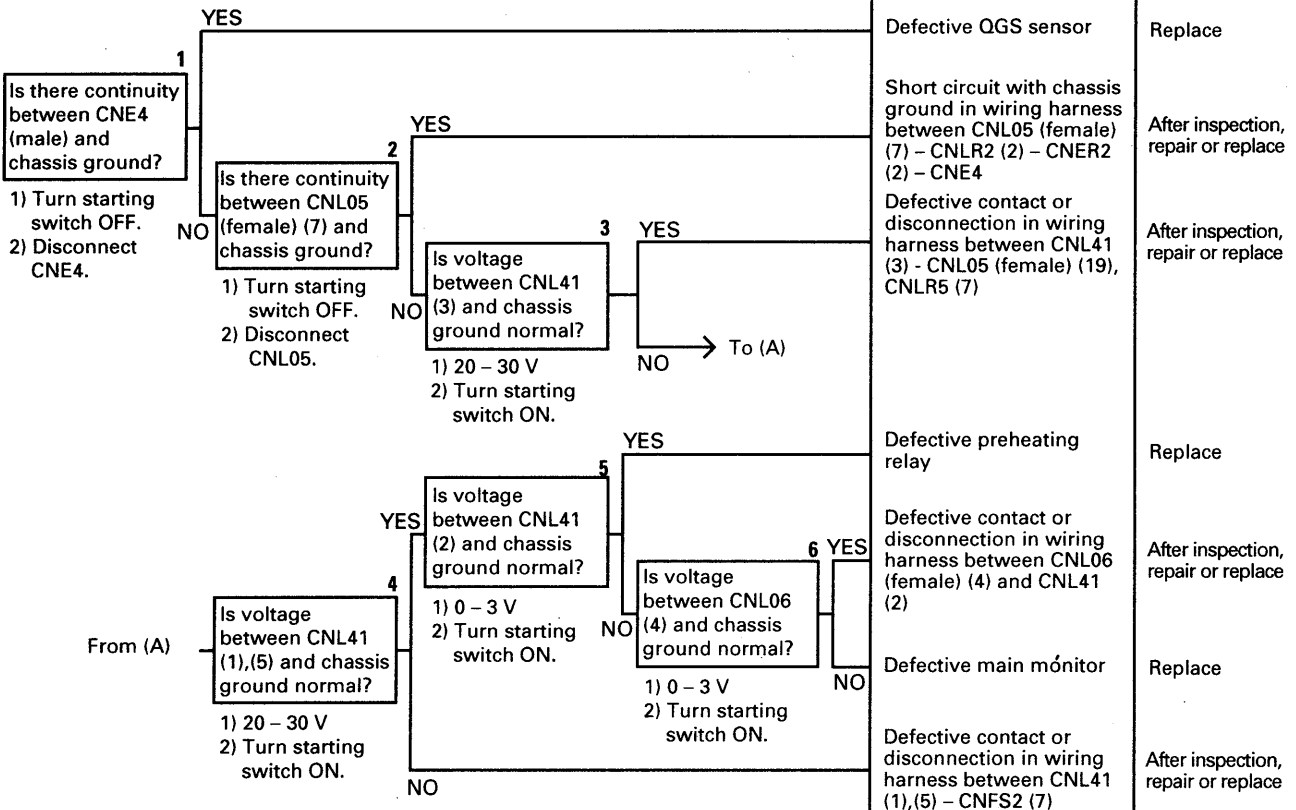
Serial No. 50001 – 52999

- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on the next step.

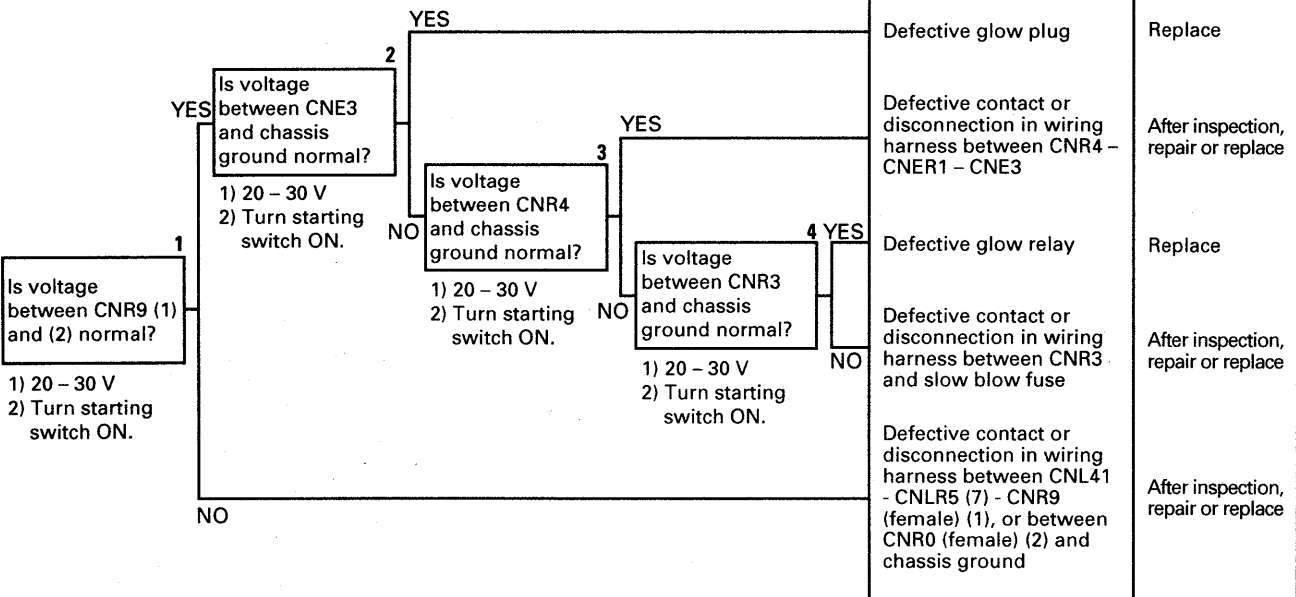
(a) Does not carry out preheating

- ★ Check that the water temperature is below 5°C.

(1) Monitor display also does not light up



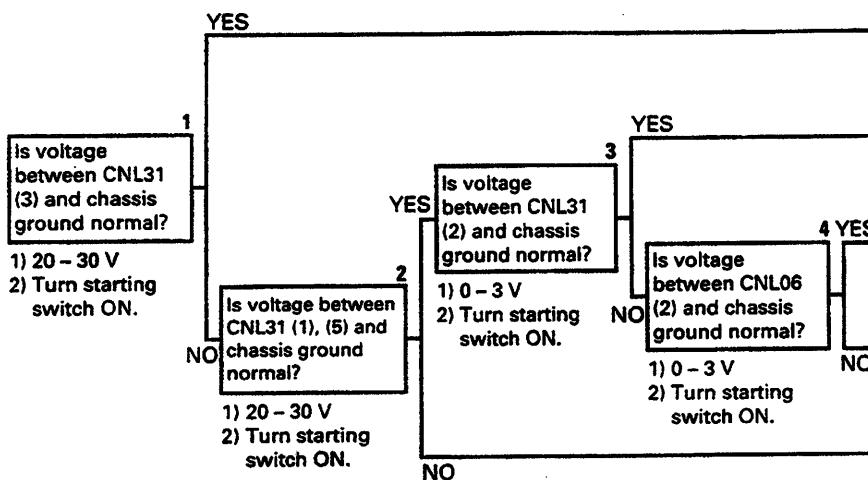
(2) Only monitor display lights up



M-11 Abnormality in rear working lamp

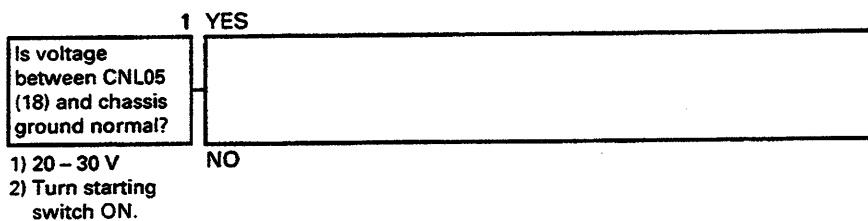
- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on the next step.
- ★ Before starting troubleshooting, check that the monitor lighting is lighted up.

(a) Neither monitor display nor rear working lamp light up



Cause	Remedy
Defective contact, or disconnection in wiring harness between CNL31 (3) - CNL05 (18), CNLR5 (6)	After inspection, repair or replace
Defective rear working lamp relay	Replace
Defective contact, or disconnection in wiring harness between CNL06 (2) and CNL31 (2)	After inspection, repair or replace
Defective main monitor	Replace
Defective contact, or disconnection in wiring harness between CNL31 (1), (5) - CNFS5 (2)	After inspection, repair or replace
Defective main monitor	Replace
Defective contact, or disconnection in wiring harness between CNL05 (female) (18) and CNL31 (3)	After inspection, repair or replace
Defective contact, or disconnection in wiring harness between CNL31 (3) - CNLR5 (6) - rear working lamp, or blown working lamp bulb	After inspection, repair or replace

(b) Working lamp lights up but monitor display does not light up



(c) Monitor lights up but working lamp does not light up



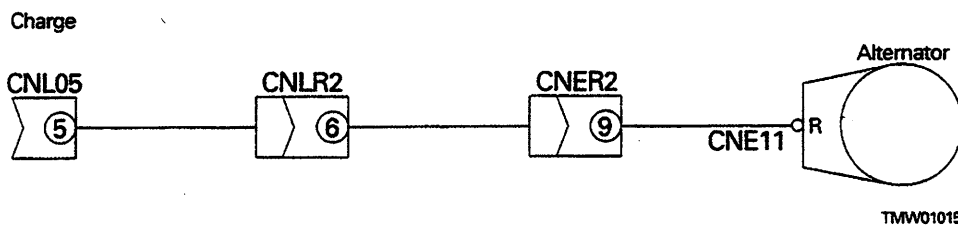
041803

M-17 Abnormality in failure display mode

- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on the next step.

(a) Does not enter failure display mode

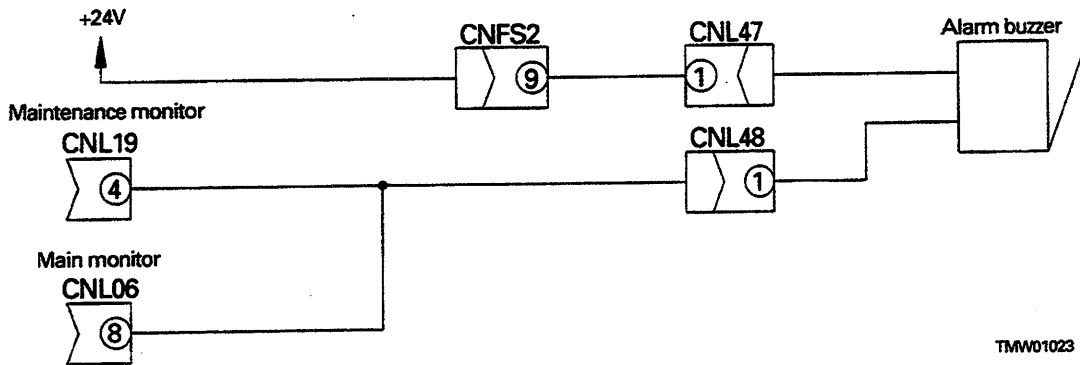
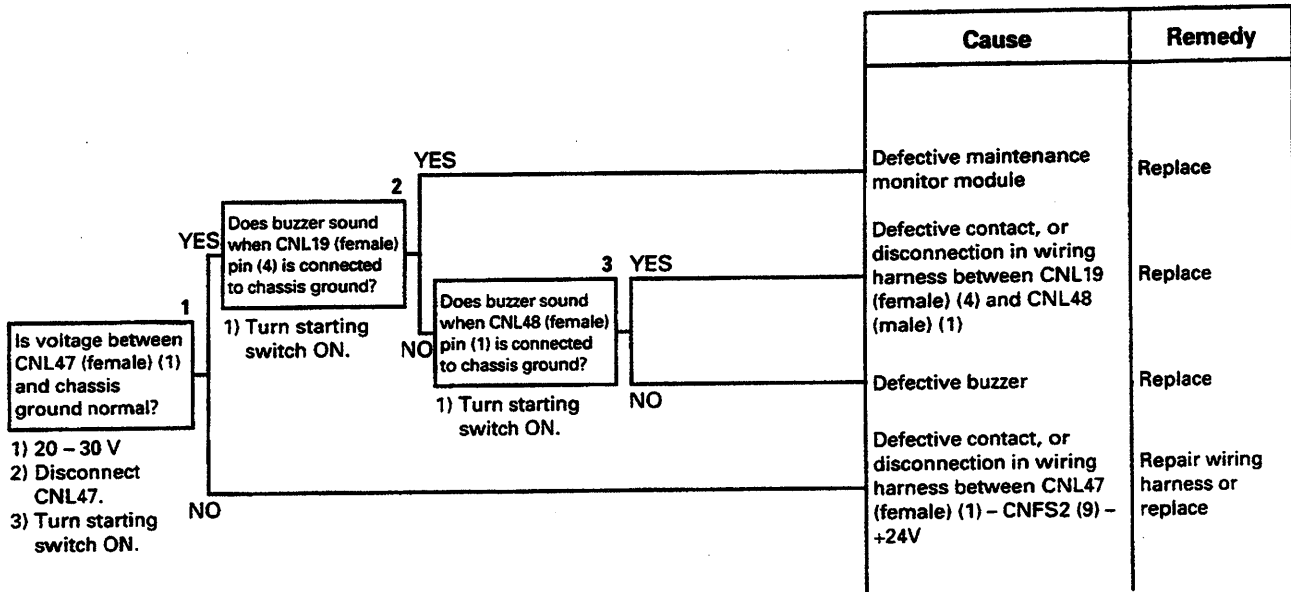
		Cause	Remedy
Is voltage between CNL05 (5) and chassis ground normal? 1) 0 - 5 V 2) Turn starting switch ON.	1 YES	Defective main monitor	Replace
	NO	Contact of power source with wiring harness between CNL05 (female) (5) - CNLR2 (6) - CNER2 (9) - alternator terminal R, or defective alternator	After inspection, repair or replace
(b) Time for time elapsed since failure on failure display mode does not advance			
Is voltage between CNL05 (5) and chassis ground normal? 1) 20 - 30 V 2) Start engine.	1 YES	Defective main monitor	Replace
	NO	Defective contact, or disconnection in wiring harness between CNL05 (female) (5) - CNLR2 (6) - CNER2 (9) - alternator terminal R, or defective alternator	After inspection, repair or replace



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K-6 CAUTION items are flashing but alarm buzzer does not sound

- ★ The buzzer does not sound for CHARGE or ENGINE OIL LEVEL.
- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on the next step.



TMW01023

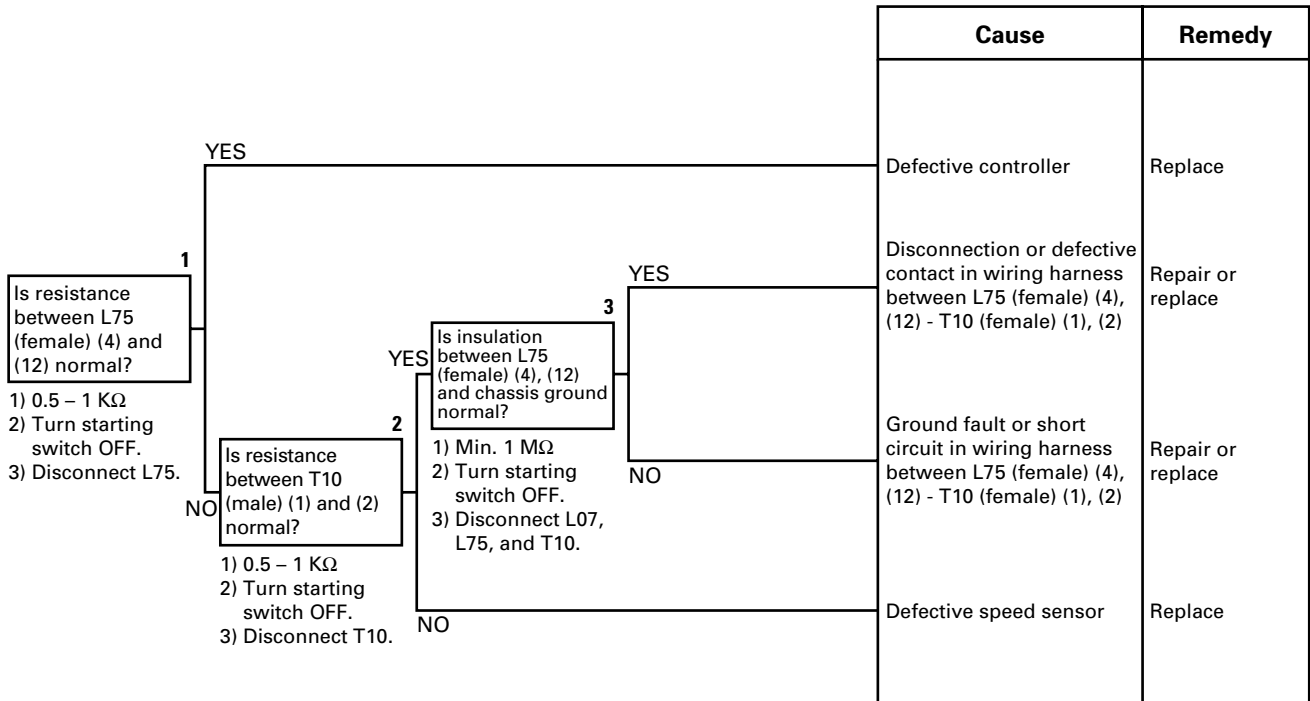
041803

TROUBLESHOOTING OF TRANSMISSION CONTROLLER SYSTEM (A MODE)

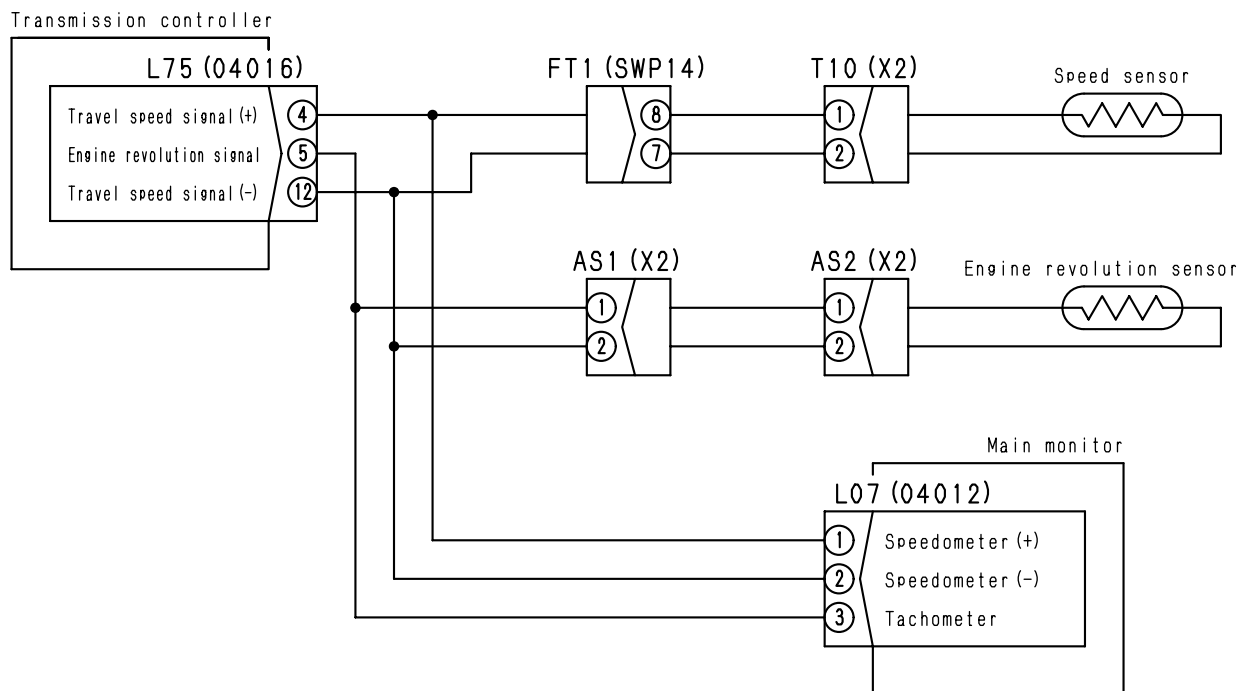
1.	Function	20-302
2.	Note on troubleshooting	20-302
3.	Failure codes list	20-203
4.	Table of failure modes and causes	20-303
5.	System diagram related to transmission controller	20-304
A-1.	Failure code [12] F solenoid signal system	20-306
A-2.	Failure code [13] R solenoid signal system	20-306
A-3.	Failure code [14] Abnormality in H-L solenoid signal system	20-307
A-4.	Failure code [16] Abnormality in speed solenoid signal system	20-308
A-5.	Failure code [20] Abnormality in directional lever signal system	20-309
A-6.	Failure code [21] Abnormality in gearshift lever signal system	20-310
A-7.	Failure code [22] Abnormality in travel speed signal system	20-311
A-8.	Failure code [23] Abnormality in engine speed signal	20-312
A-9.	Holding switch system	20-313
A-10.	Kick-down switch system	20-313
A-11.	Transmission cut-off signal system	20-314
A-12.	Neutralizer relay signal system	20-315
A-13.	Alarm buzzer signal system	20-316
A-14.	Network signal system	20-317
A-15.	Controller power supply system	20-318

A-7. Failure code [22] Abnormality in travel speed signal system

- ★ When disconnecting or connecting a connector, be sure to turn the power OFF.
- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on to the next step.



A-7. Related electrical circuit diagram






BJW11797

METHOD OF USING MANUAL

1. When removing or installing unit assemblies

- (1) When removing or installing a unit assembly, the order of work and techniques used are given for the removal operation; the order of work for the installation operation is not given.
- (2) Any special techniques applying only to the installation procedure are marked ※ 1, and the same mark is placed after the relevant step in the removal procedure to indicate which step in the installation procedure it applies to.

(Example)

REMOVAL OF ○○○ ASSEMBLY	Title of operation
	Precautions related to safety when carrying out the operation
1. XXXX (1)	Step in operation
★	Technique or important point to remember when removing XXXX (1).
2. △△△ (2):	※ 1 Indicates that a technique is listed for use during installation
3. □□□□ assembly (3)	
	See Lubricant and Coolant Table
INSTALLATION OF ○○○ ASSEMBLY	Title of operation
● Carry out installation in the reverse order to removal.	
※ 1	Technique used during installation
★	Technique or important point to remember when installing △△△ (2).
● Adding water, oil	Step in operation
★	Point to remember when adding water or oil
	Quantity of filling oil and water

2. General precautions when carrying out installation or removal (disassembly or assembly) of units are given together as PRECAUTION WHEN CARRYING OUT OPERATION, so be sure to follow these precautions when carrying out the operation.

3. Listing of special tools

- (1) For details of the description, part number, and quantity of any tools (A1, etc.) that appear in the operation procedure, see the SPECIAL TOOLS LIST given in this manual.

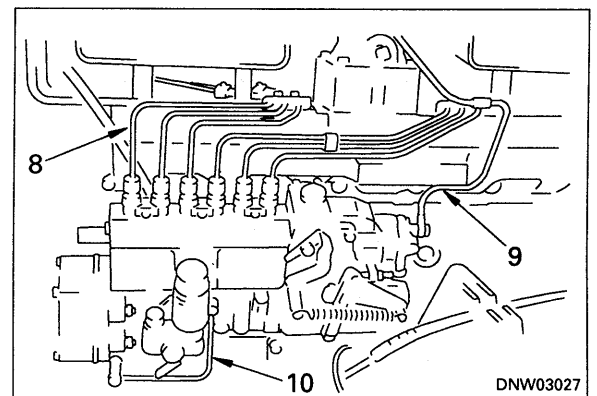
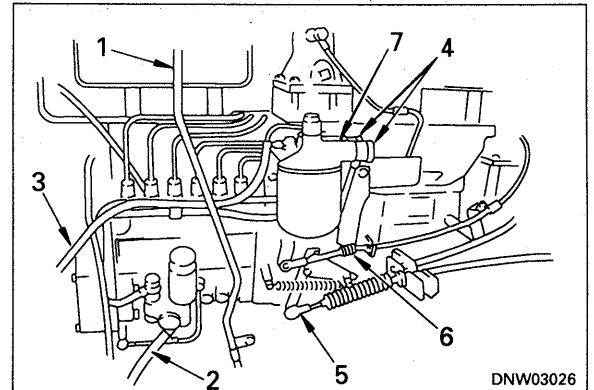
041803

REMOVAL OF FUEL INJECTION PUMP ASSEMBLY

Serial No. 50001 – 52999

1. Remove muffler drain tube (1).
2. Disconnect fuel supply hose (2) and fuel filter return hose (3), then remove fuel filter tube (4).
 - ★ After removing the fuel supply hose, bend the hose and tie it with wire to prevent the fuel from spilling.
3. Disconnect fuel control cable (5) and stop motor cable (6).
4. Remove fuel filter assembly (7) together with bracket.
5. Disconnect delivery tube (8), then remove boost compensation tube (9) and lubrication tube (10).

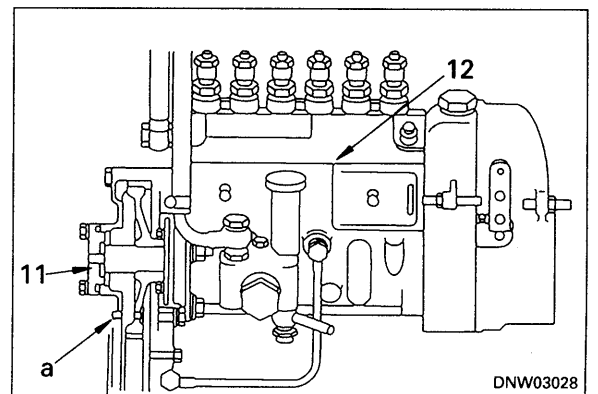
※ 1



6. Remove cover (11), and crank to a position where pin ① (ø4.0 – 4.5mm, length=approx. 100mm) enters injection pump drive gear from portion a.
7. Remove fuel injection pump assembly (12).

※ 2

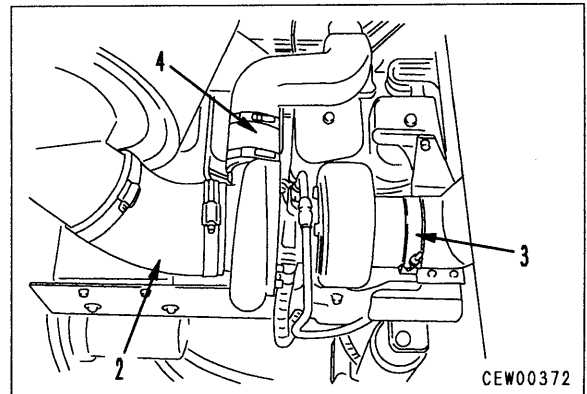
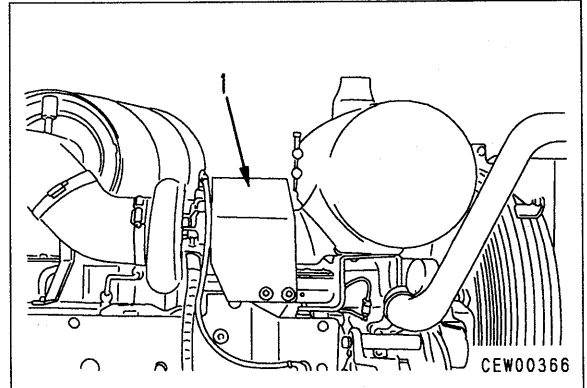
- ★ Remove the injection pump rear mounting bracket, then remove 4 injection pump front mounting bolts.



REMOVAL OF TURBOCHARGER ASSEMBLY

Serial No. 53001 and up


1. Lift off engine hood assembly.
For details, see REMOVAL OF ENGINE HOOD ASSEMBLY.
2. Remove cover (1).
3. Remove suction hose (2). ※ 1
4. Remove connecting clamp (3) of exhaust muffler and turbocharger.
5. Loosen clamp of intake connector intermediate hose (4) and move towards connector.
6. Disconnect turbocharger lubrication inlet hose (5) and drain tube (6). ※ 2
7. Remove 4 turbocharger mounting nuts (7), then remove turbocharger (8). ※ 3





INSTALLATION OF TURBOCHARGER ASSEMBLY


Serial No. 53001 and up

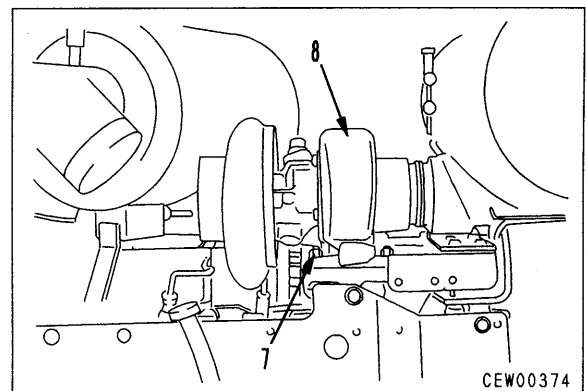
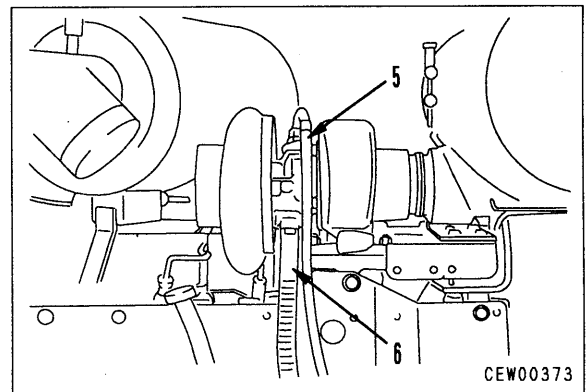
- Carry out installation in the reverse order to removal.

※ 1  Intake hose clamp:
 $10 \pm 2 \text{ Nm } \{1.02 \pm 0.2 \text{ kgm}\}$

※ 2  Turbocharger lubrication inlet hose:
 $35 \pm 5 \text{ Nm } \{3.6 \pm 0.5 \text{ kgm}\}$

 Turbocharger drain tube:
 $24 \pm 4 \text{ Nm } \{2.45 \pm 0.41 \text{ kgm}\}$

※ 3  Turbocharger mounting nut:
 $43 \pm 6 \text{ Nm } \{4.39 \pm 0.61 \text{ kgm}\}$



REMOVAL OF CYLINDER HEAD ASSEMBLY

Serial No. 53001 and up

! Disconnect the cable from the negative (-) terminal of the battery.

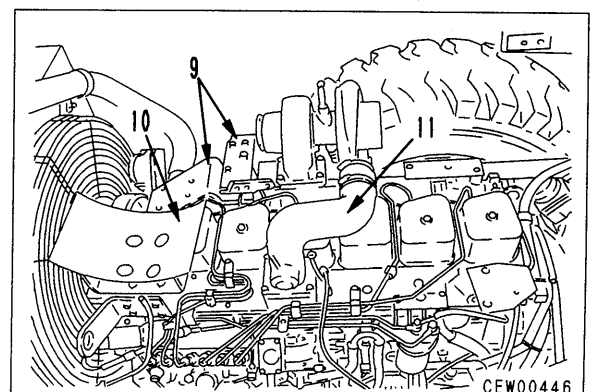
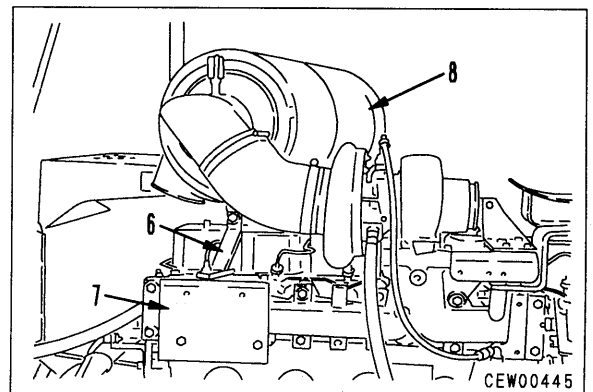
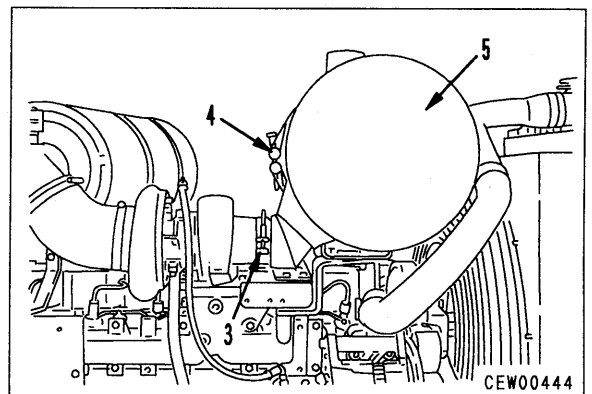
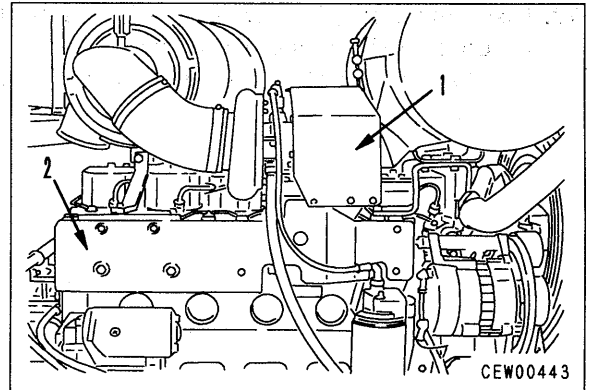
1. Drain coolant.
2. Remove engine hood assembly.
For details, see REMOVAL OF ENGINE HOOD ASSEMBLY.
3. Remove covers (1) and (2).

4. Remove connecting clamp (3) of exhaust muffler and turbochager. ※ 1
5. Remove exhaust muffler band (4), then remove exhaust muffler assembly (5).

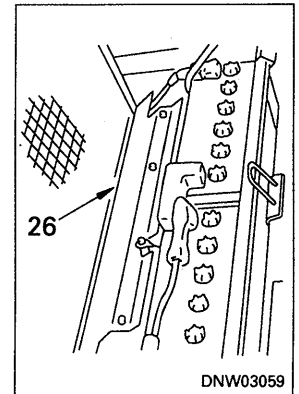
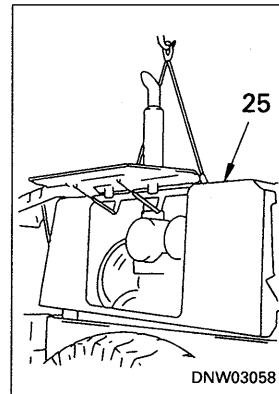
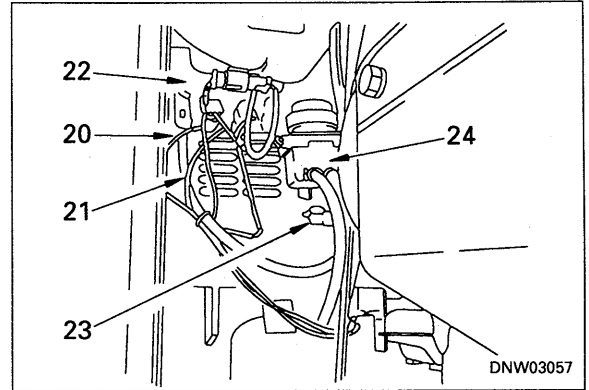
6. Remove bracket (6) and cover mounting bracket (7).
★ Be careful not to lose the spacer.

7. Loosen intake hose clamp, remove 3 mounting bolts, then remove air cleaner assembly (8) together with bracket.

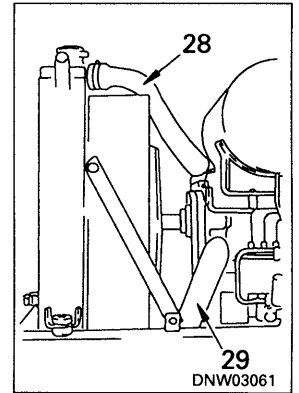
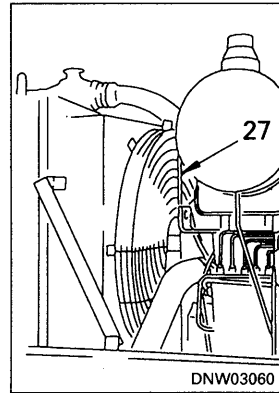
8. Remove exhaust muffler brackets (9) and (10).
9. Disconnect intermediate clamp at turbochager end, then remove air supply connector (11).



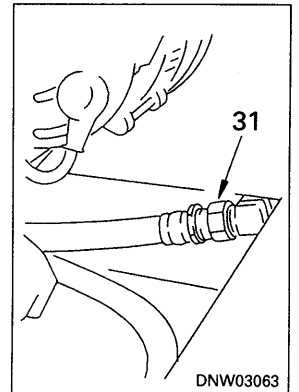
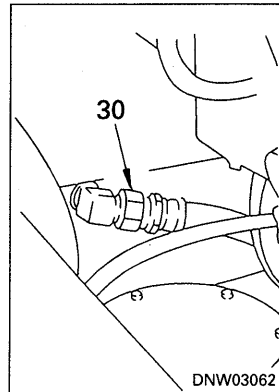
- 13. Disconnect window washer hoses (20) and (21) from window washer tank (22).
 - ★ Make marks to distinguish the hoses.
- 14. Disconnect brake oil level sensor connector (23).
- 15. Remove brake tank (24).
 - ★ Open the inspection cover at the top of the hood.
 - ★ Tighten the cap of the brake tank and secure it to the mounting clamp on the frame for the grease gun.
- 16. Fit I-bolt on top of hood (25), then sling, remove mounting bolts, and lower hood assembly slowly.
 - ★ Open the side door of the hood to prevent interference.
- 17. Remove baffle plate (26).



- 18. Remove fan guard (27). ※ 2
- 19. Disconnect radiator hoses (28) and (29) from engine end.



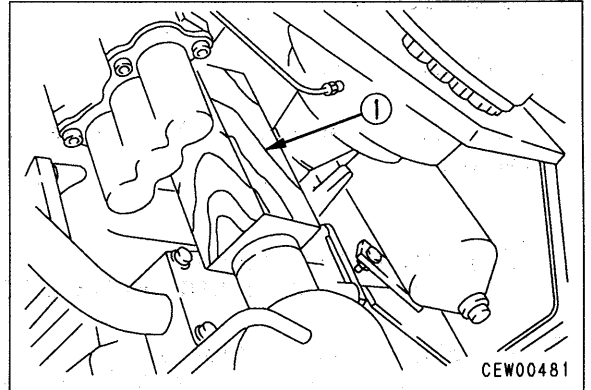
- 20. Disconnect oil cooler hoses (30) and (31). ※ 3



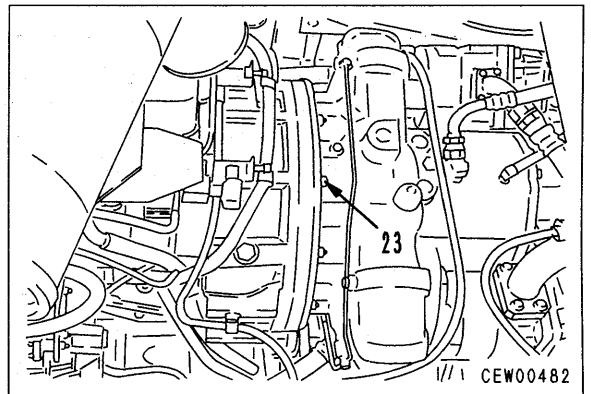
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18. Set support stand ① securely under transmission.

★ Adjust the height properly, then insert support stand ①.



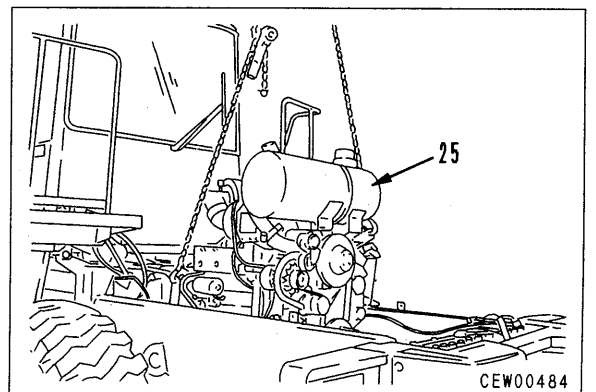
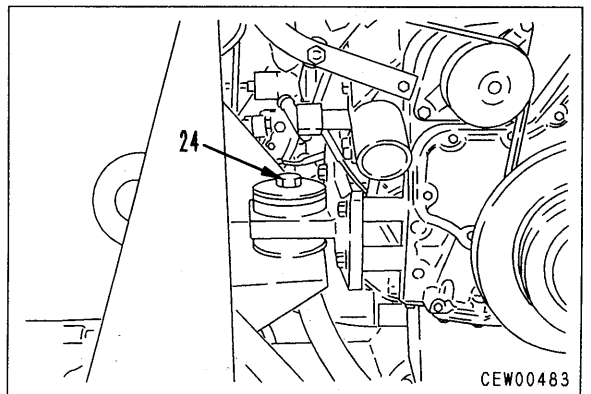
19. Sling engine assembly, then remove nuts (23) connecting to transmission. ※ 3



20. Remove left and right mount bolts (24), then raise engine assembly (25) slowly and lift off. ※ 4

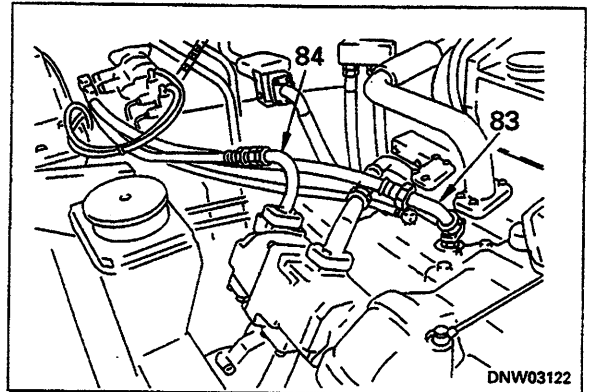
★ When removing the engine assembly, be extremely careful not to damage the wiring and piping.

kg Engine assembly : 520 kg

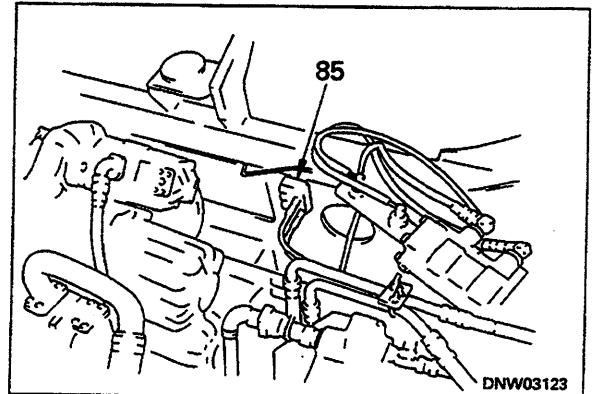


15. Brake hoses

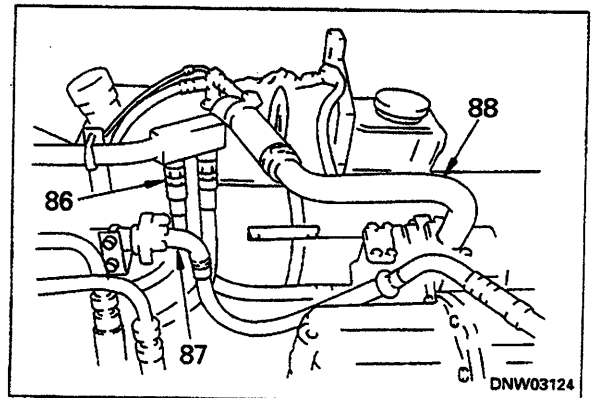
- 1) Disconnect hose (83) between transmission and power master cylinder at transmission end.
- 2) Disconnect tube (84) between torque converter charging pump and power master cylinder at torque converter charging pump end.

**16. Remove mounting bolt of cushion valve (85).**

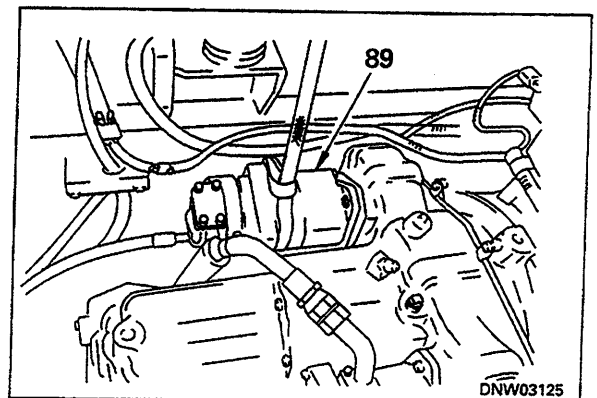
- ★ Set the cushion valve on top of the rear frame lower hinge.

**17. Hydraulic, steering pump**


- 1) Disconnect hoses (86) and (87) between hydraulic, steering pump and priority valve at priority valve end.
- 2) Remove tube (88) between hydraulic, steering pump and hydraulic tank.

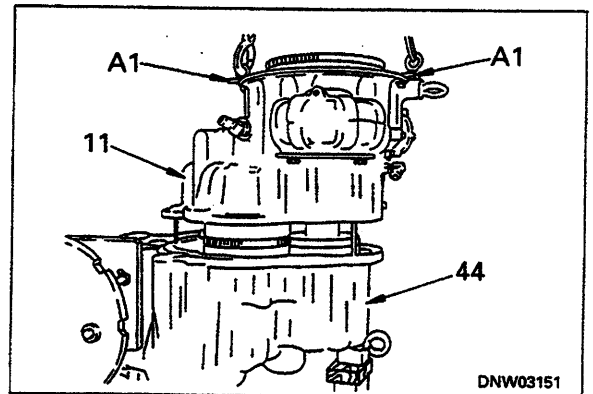


- 3) Lift off hydraulic and steering pump (89) together with hose. ※ 11



- 3) Using forcing screws, raise rear housing (11), then use tool A1 to lift it off.
 - ★ Remove slowly and be careful not to damage the seal ring.
 - ★ When removing, install guide bolts to front housing (44) and lift off horizontally.

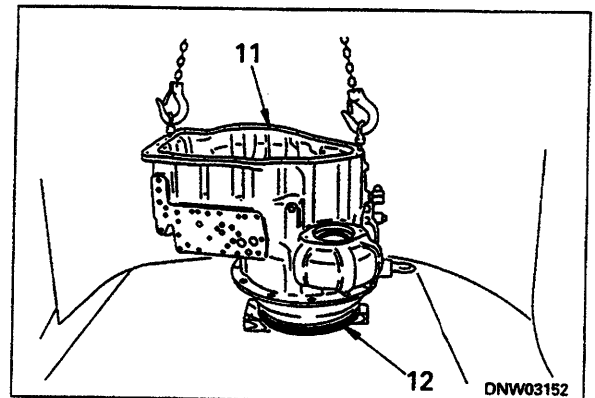
 Rear housing, torque converter assembly: 160 kg



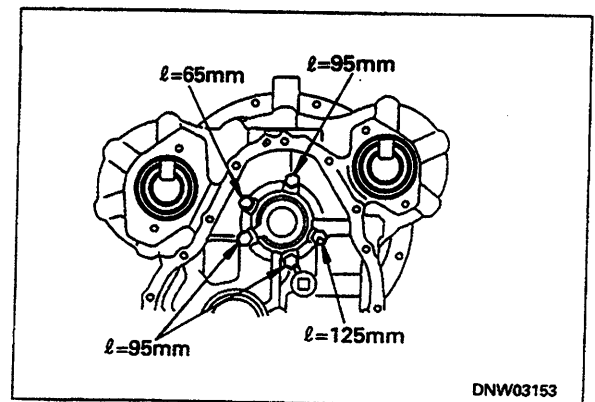
7. Torque converter

Lift off torque converter (12) from rear housing (11).

- ★ Before removing, use a felt pen to make match marks on the mating surface of the housing and torque converter.

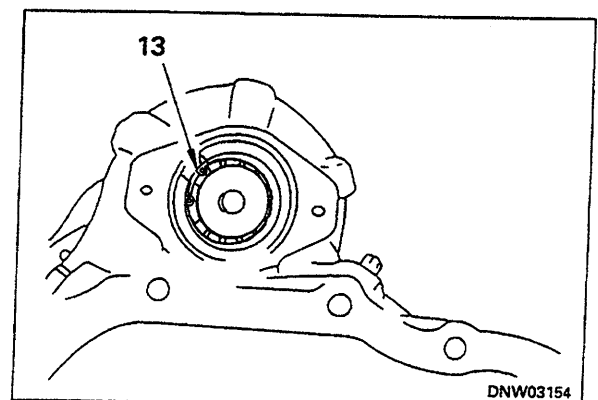


- ★ The length of the mounting bolts is different, so make marks.



8. Pump (torque converter, loader)

- 1) Remove snap ring (13) at torque converter pump mount end.

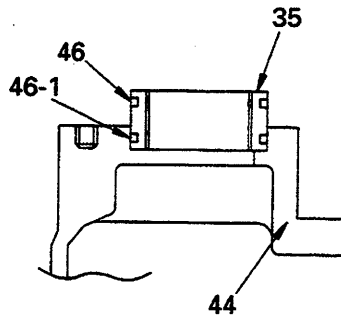


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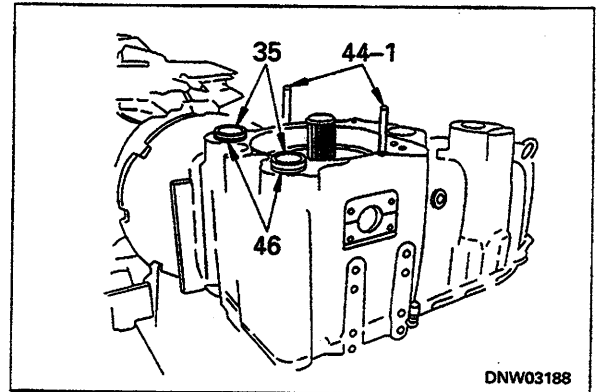
041803

- ★ When the rotating torque is within the standard value, check that the end play is "0".
 - ★ Leave the guide pin as it is.
- 4) Assemble O-rings (46) and (46-1) to spacer (35), and install to front housing (44).
- ★ Coat the outside circumference of O-ring thinly with grease.

 Outside circumference of O-ring:
Grease (G2-LI)



DMW03191



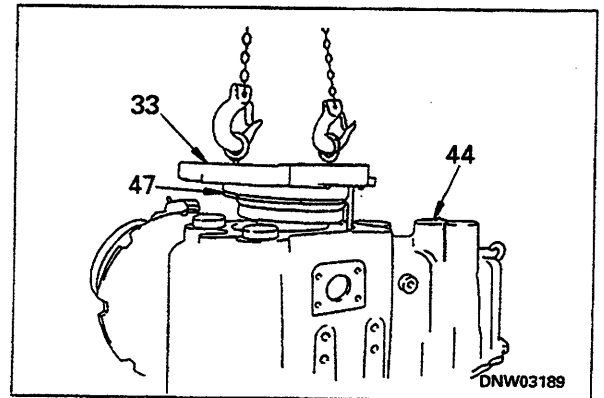
DNW03188

- 5) Align with guide pin (44-1) of front housing (44), assemble selected shim (45) and O-ring (47), raise parking brake retainer assembly (33), then assemble to housing mount portion.

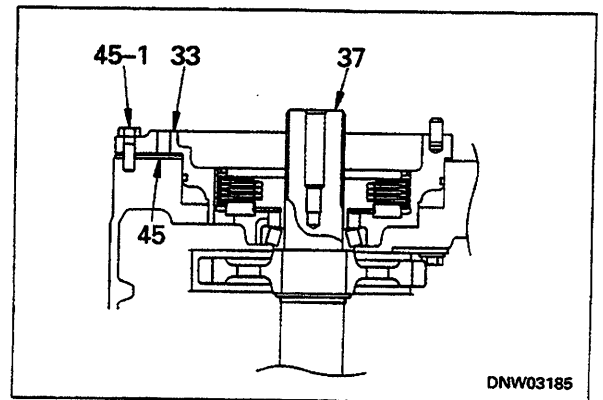
- ★ Assemble the thinnest shim on the inside and the thickest shim on the outside.
- ★ Coat the outside circumference of the parking brake retainer assembly with grease.

 Outside circumference of O-ring:
Grease (G2-LI)

 Mounting bolt:
110.3 ± 12.3 Nm (11.25 ± 1.25 kgm)

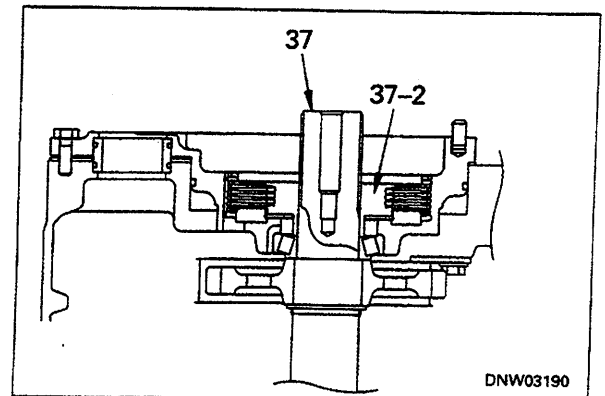


DNW03189



DNW03185

- 6) Align with parking brake disc spline and assemble hub spline (37-2) to output shaft (37).
- ★ Align the spline of the disc with a screwdriver.
 - ★ If the spline cannot be aligned, rotate lightly while assembling. Never use force to push it in.



DNW03190

DISASSEMBLY OF CLUTCH PACK ASSEMBLY

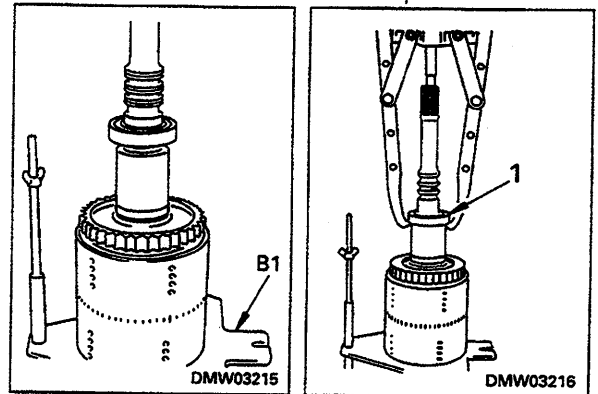
Disassembly of FR clutch pack

⚠ The clutch pack is oily, so be careful not to let it slip when setting the clutch pack on the stand. Be careful also not to get your fingers caught between the stand and the clutch pack.

★ Set on tool **B1** with the FORWARD clutch side at the top.

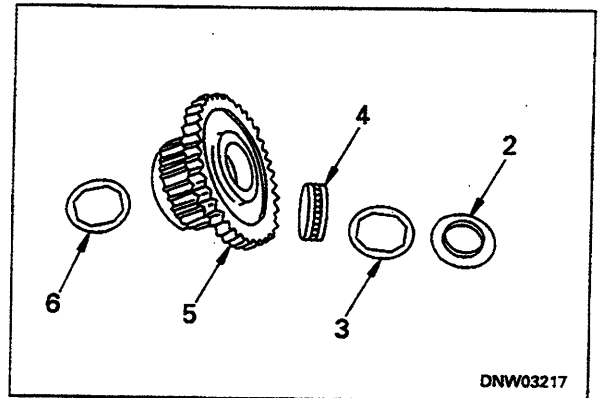
1. Bearing

Using puller, remove bearing (1).



2. Spacer, FORWARD gear

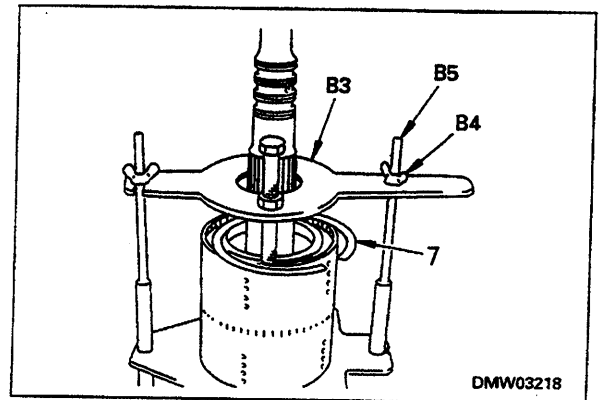
Remove spacer (2), thrust washer (3), needle bearing (4), FORWARD gear (5), and thrust washer (6).



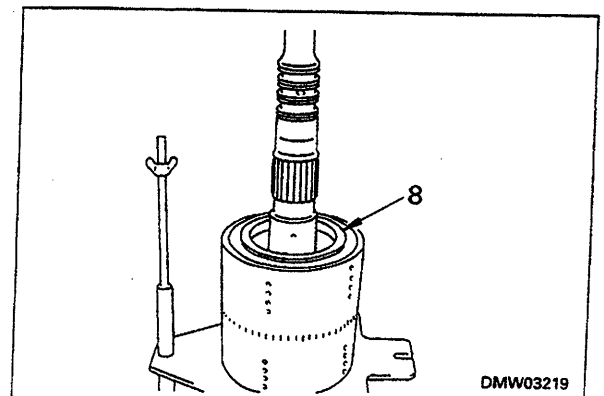
3. End plate

1) Install tools **B3** and **B5**, then tighten tool **B4** and remove ring (7).

★ After removing the ring, remove tool **B3**.



2) Remove end plate (8).



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Assembly of 1st and 3rd clutch pack

⚠ The clutch pack is oily, so be careful not to let it slip when setting the clutch pack on the stand. Be careful also not to get your fingers caught between the stand and the clutch pack.

- ★ Set the shaft housing on the assembly stand with the 3rd clutch side at the top.

1. Piston seal

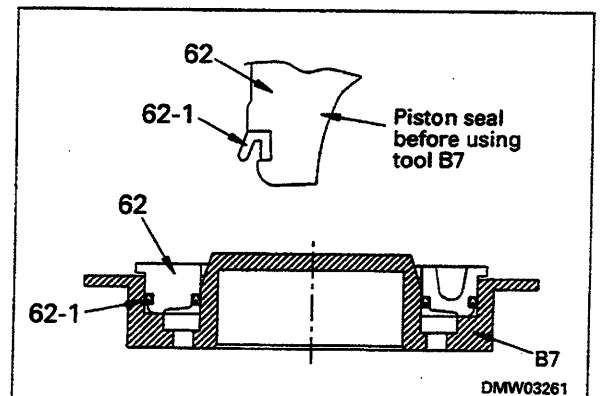
Assemble piston seal (62-1) to piston (62).

- ★ When assembling a new piston seal, use tool B7 to make the seal fit well (time: approx. 2 – 3 minutes), then assemble the seal.
- ★ If the seal is assembled to the cylinder without making it fit first, the seal will be damaged.



Inside surface of tool B7:

Transmission oil

**2. 3rd piston**

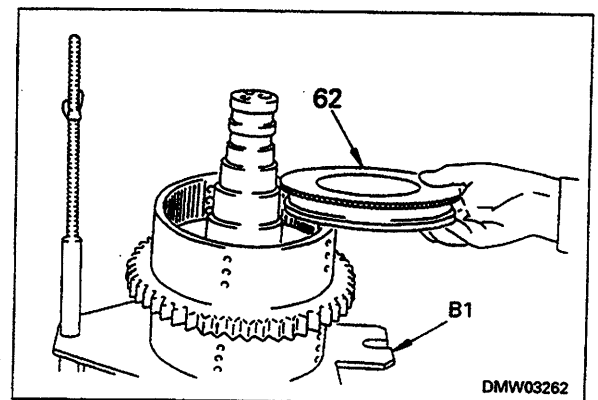
Install 3rd piston (62).

- ★ Be careful not to damage the piston seal.
- ★ Check that the spring pin does not extend from the circumference of the shaft.



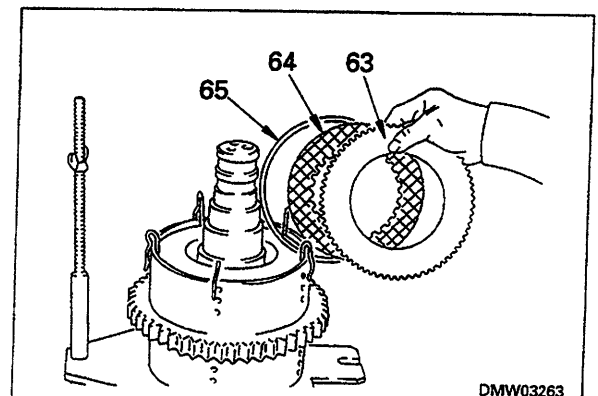
Sliding surface of piston seal:

Transmission oil

**3. Clutch plate**

Assemble plate (63), disc (64), and spring (65) in turn to housing.

- ★ Soak disc (64) in clean transmission oil for at least 2 minutes before assembling.
- ★ Be careful to assemble so that disc (64) and spring (65) are not resting on each other.
- ★ Be careful that plate (63) or spring (65) are not caught in the clutch housing ring groove when assembling.



ASSEMBLY OF PARKING BRAKE ASSEMBLY

1. Housing

1) Press fit oil seal (22) and dust seal (23) to housing (4).

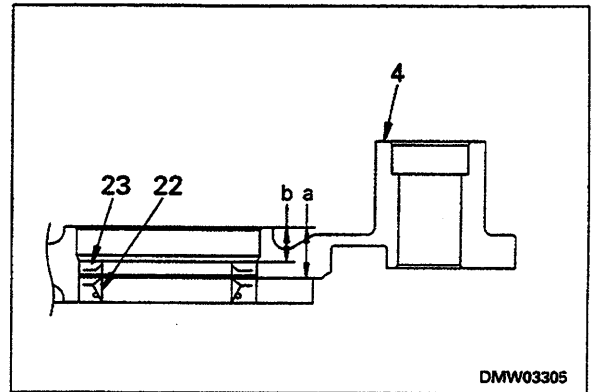
★ Be careful not to let the seal lean at an angle when press fitting.

★ Oil seal press-fitting dimension (a):
 19 ± 1 mm

★ Dust seal press-fitting dimension (b):
 11 ± 1 mm

 Lip of seal: **Grease (G2-LI)**

★ Coat with grease when assembling the housing.



2) Press fit needle bearing (24) and oil seal (25) to housing (4) to specified dimension.

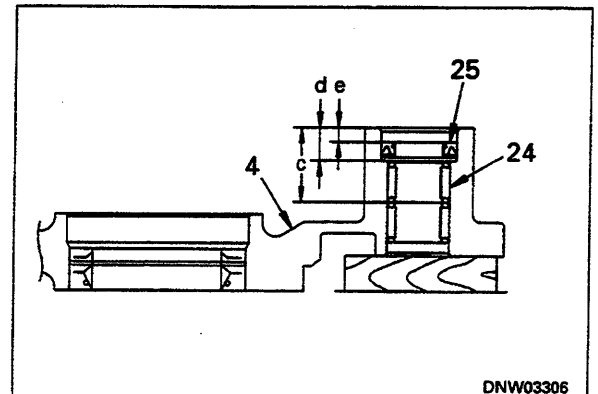
★ Needle bearing press-fitting dimension (c):
 39.0 ± 0.1 mm (1st)

★ Needle bearing press-fitting dimension (d):
 17.0 ± 0.5 mm (2nd)

★ Oil seal press-fitting dimension (e):
 8.0 ± 0.3 mm

 Lip of seal: **Grease (G2-LI)**

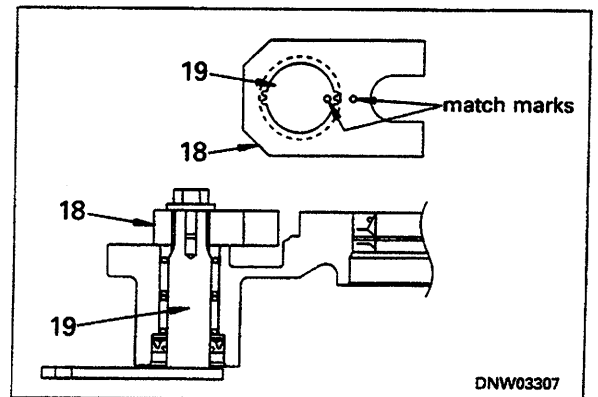
★ Set a stand under the housing to prevent the bearing and seal from leaning at an angle when press fitting.



3) Insert outside lever (19) from oil seal end.


★ Clean and remove all oil and grease from the bolt hole of the outside lever.

4) Align match marks and assemble inside lever (18).



5) Coat thread of lock bolt (17) with thread tightener, then tighten.

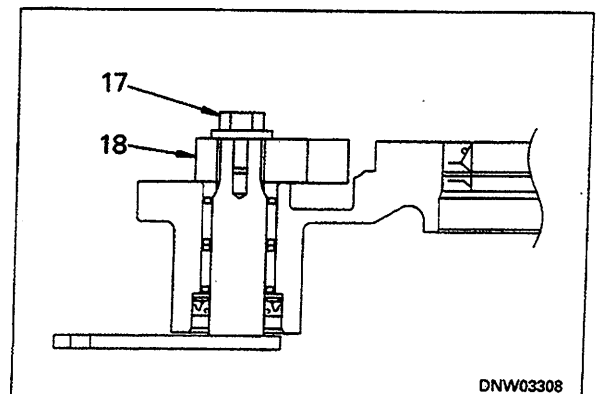
 Lock bolt: **Thread tightener (LT-2)**

 Lock bolt:

66.2 ± 7.4 Nm (6.75 ± 0.75 kgm)

★ Do not forget to assemble the washer.

★ Clean and remove all oil and grease from the lock bolt and bolt hole.

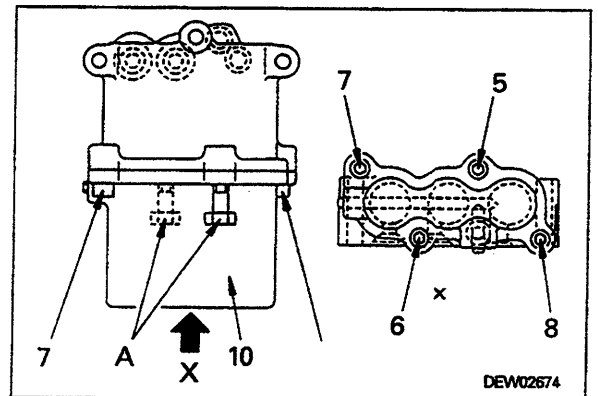
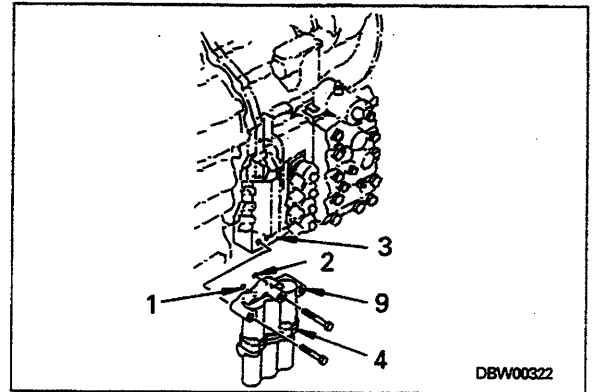


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DISASSEMBLY, ASSEMBLY OF ACCUMULATOR VALVE ASSEMBLY

Disassembly of accumulator valve assembly

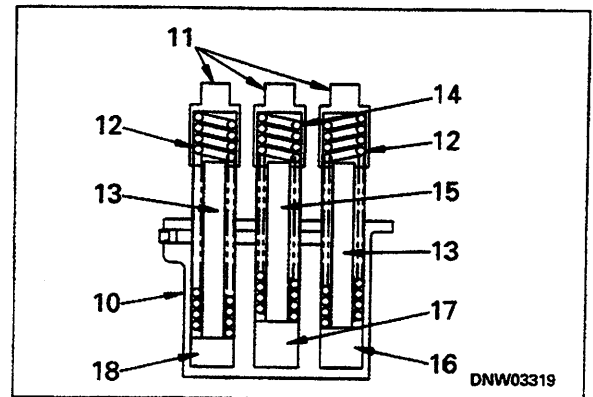
1. Remove accumulator valve (4) from transmission assembly (3).
2. Remove O-rings (1) and (2) from accumulator valve (4).
3. Set pads in vice, then set accumulator valve body (9) in vice.
4. Remove mounting bolts (5) and (6), and assemble guide bolts (10mm, P=1.5, l =approx. 40mm).
5. Remove bolts (7) and (8), then remove cover (10) together with guide bolt a.
 - ★ The internal parts will come out together with the cover, so be extremely careful not to damage them when removing.



6. Pull out valve (11), springs (12) and (14), stoppers (13) and (15), and spacers (16), (17), and (18) from cover (10).
 - ★ Fit tags to distinguish the springs, stoppers, and spacers, and use as reference when assembling.

★ Reference

	Spring	Stopper	Spacer
·FORWARD	$l=185$	$l=147.6$	$l=10$
·1st	$l=158$	$l=110.1$	$l=41.1$
·2nd	$l=158$	$l=125$	$l=21.1$



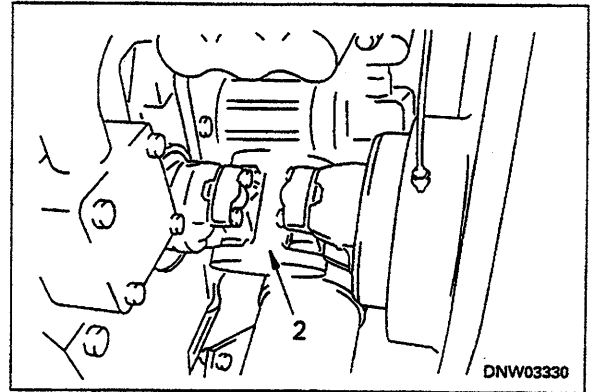
041803

4. Drive shaft

Remove rear drive shaft (2).

※ 2

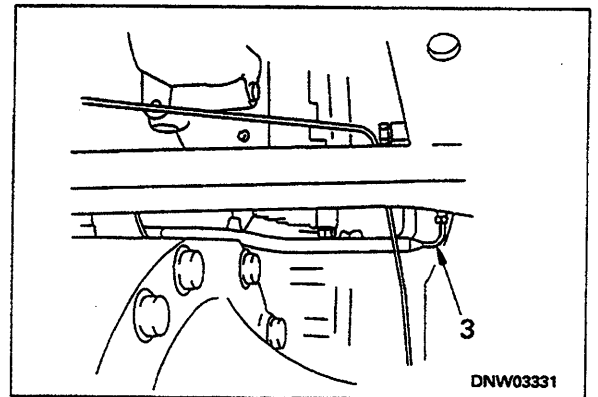
★ Make match marks to show the mounting position.



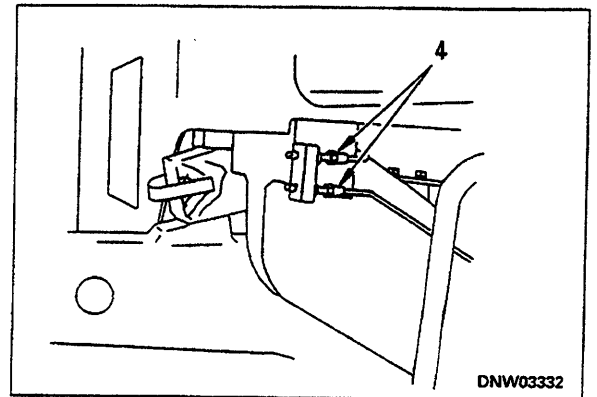
5. Brake hose, grease tube

1) Disconnect brake hose (3).

※ 3



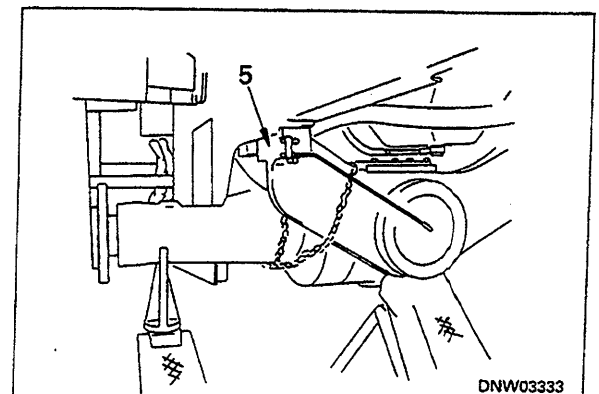
2) Disconnect grease tube (4).



6. Axle

1) Secure pivot (5) to axle with wire.

★ Fix securely so that the pivot does not move.



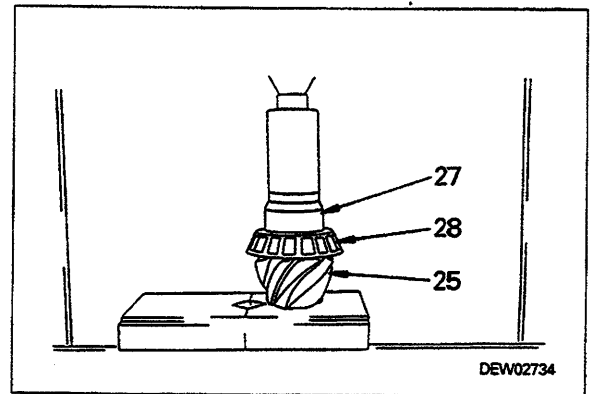
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ASSEMBLY OF DIFFERENTIAL

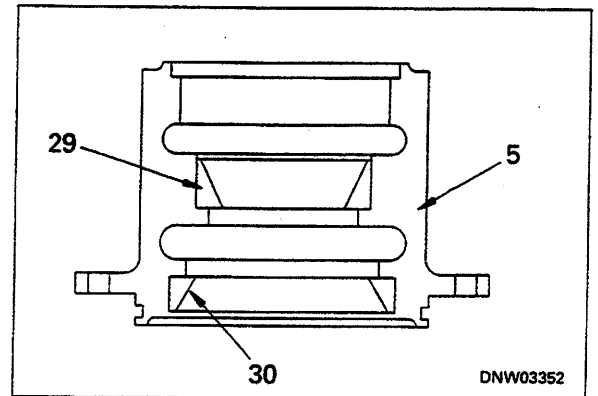
1. Pinion gear

- 1) Press fit bearing cone (28) in pinion gear (25), then assemble spacer (27).

★ There must be no clearance at the contact surface of any parts.



- 2) Press fit bearing cups (29) and (30) in cage (5).



- 3) Assemble pinion gear (25) in cage (5), then press fit bearing cone (26).

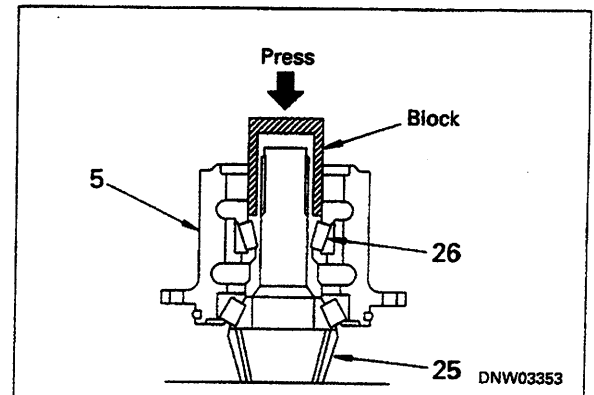
★ The front pinion gear and rear pinion gear are different, so be careful not to mistake them when installing.

★ Apply pressure to the bearing at the specified load, and rotate the cage to settle the bearing.

Press load: 5 ton

 **Bearing: Oil (axle oil)**


★ When rotating the cage at the specified load, rotate lightly by hand. If the rotation is not smooth, replace the bearing and spacer, and check that rotate lightly by hand again.

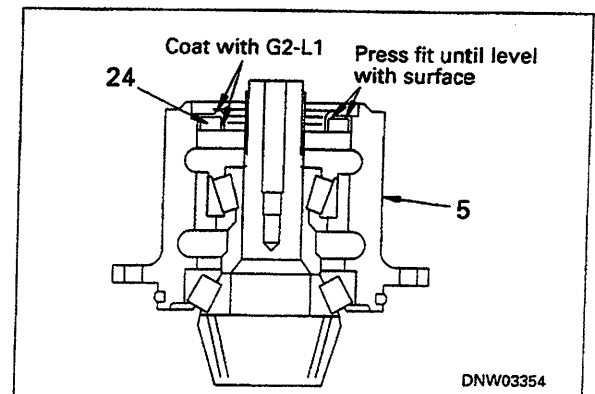


- 4) Press fit oil seal (24) to cage (5).

★ Press fit oil seal (24) until it is level with the surface.

 Lip of oil seal: **Grease (G2-LI)**

 Pinion gear shaft: **Grease (G2-LI)**

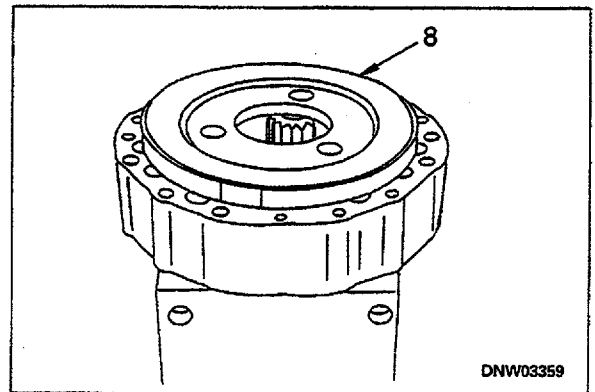


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4. Brake outer ring

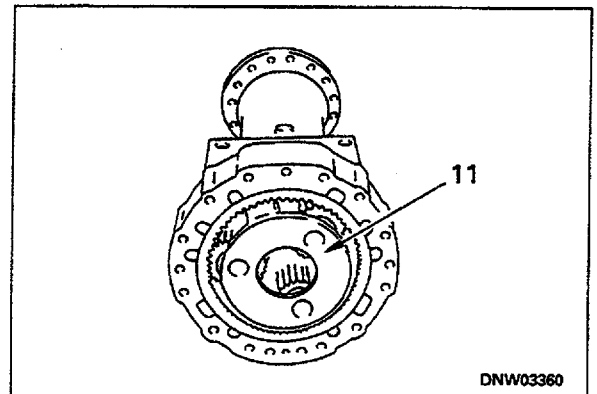
Remove brake outer ring (8).

- ★ Be careful not to damage the contact surface of the brake disc.
- ★ Pull out pin.

**5. Planetary carrier**

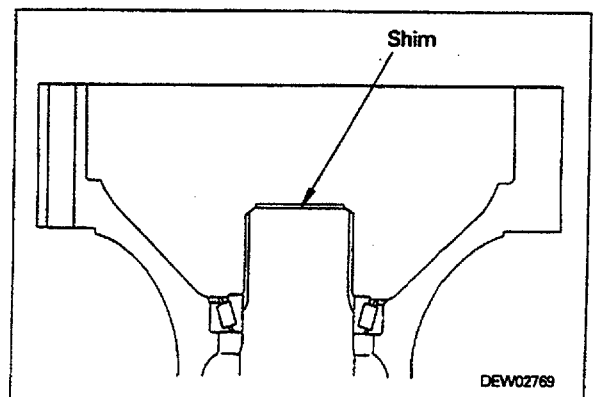
1) Remove axle shaft mounting bolts, then remove planetary carrier (11).

- ★ When removing the planetary carrier, be careful not to get your fingers caught between the pinion gears.

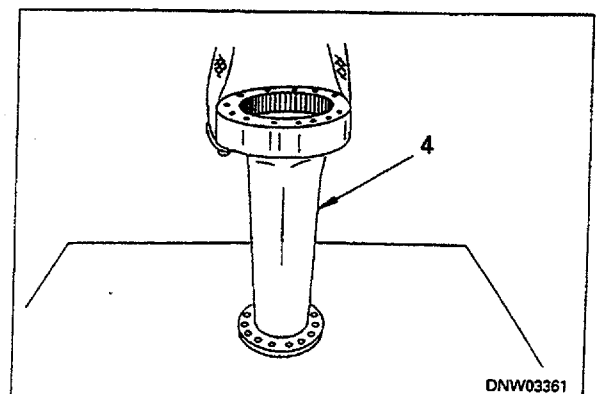


2) Remove shims.

- ★ Check the number and thickness of the shims, and use as reference when assembling.

**6. Axle shaft**

1) Stand housing (4) and raise approx. 20 mm.



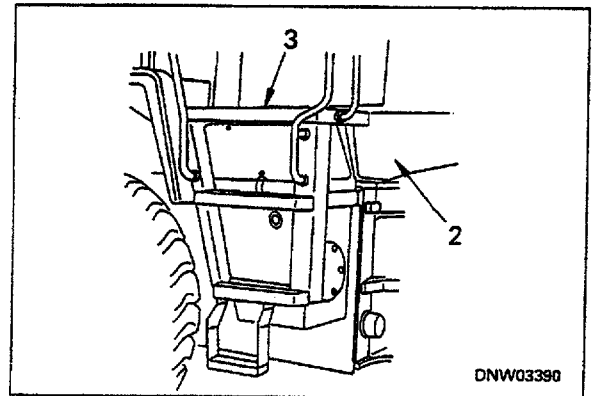
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REMOVAL OF CENTER HINGE PIN

- ⚠ Stop the machine on level ground and install the safety bar on the frame. Lower the bucket to the ground and stop the engine. Then apply the parking brake and put blocks under the wheels to prevent the machine from moving.
- ⚠ Remove the cover at the top of the hydraulic tank, and loosen the oil filler cap slowly to release the pressure inside the hydraulic tank. Then operate the steering wheel and control levers several times to release the remaining pressure in the hydraulic piping.
- Loosen the plug at the top of the hydraulic tank filter to prevent the oil inside the hydraulic tank from flowing out.
For details, see REMOVAL OF TRANSMISSION, TORQUE CONVERTER ASSEMBLY.
- ⚠ Disconnect the cable from the negative (-) terminal of the battery.
- ★ Set a pallet under the bucket.

1. Bodywork

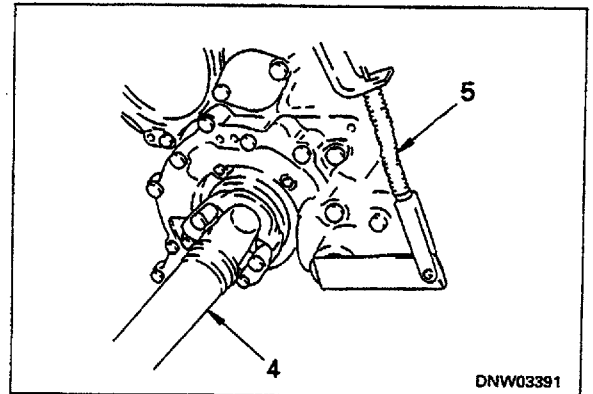
- 1) Remove cover (2) under cab.
 - ★ Remove the cover at the front on the opposite side also.
- 2) Remove ladder assembly (3).
 - ★ Remove the ladder on the opposite side also.



2. Drive shaft

- Disconnect center drive shaft (4).
- ★ Set a block under the drive shaft and disconnect. ※ 1

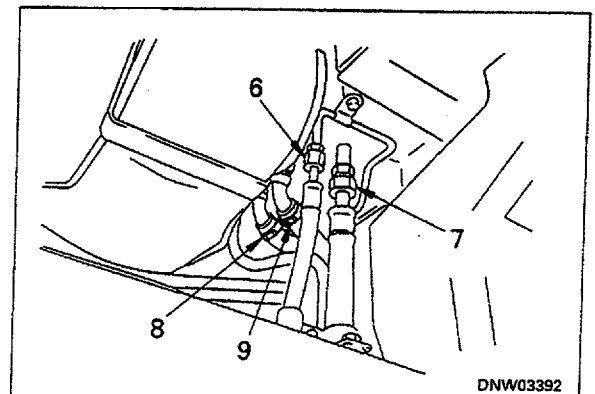
 Center drive shaft: 20 kg



3. Disconnect parking cable (5) from transmission. ※ 2

4. Air conditioner, heater hoses

- 1) Disconnect air conditioner hoses (6) and (7).
- 2) Loosen clamps of heater hoses (8) and (9) and disconnect from hose.
 - ★ After disconnecting the hoses, fit covers to prevent dirt, dust, or water from entering the mouthpiece.
 - ★ Carry out the air return operation for the compressor, then use a gauge manifold and release the refrigerant slowly from the high-pressure valve. ※ 3



REMOVAL OF STEERING VALVE ASSEMBLY

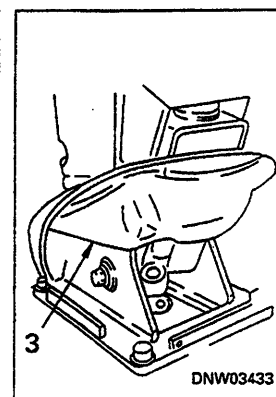
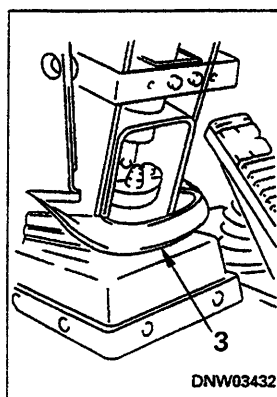
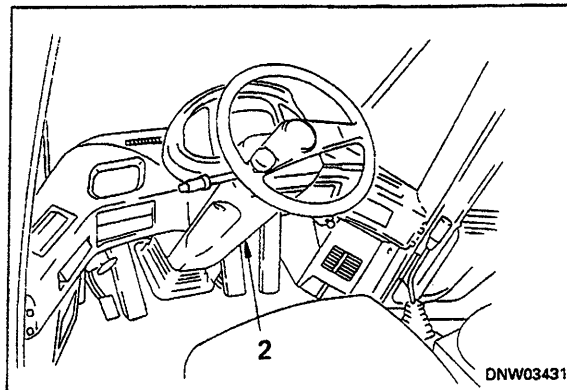
⚠ Stop the machine on level ground and install the safety bar on the frame. Lower the bucket to the ground and stop the engine. Then apply the parking brake and put blocks under the wheels to prevent the machine from moving.

⚠ Remove the cover at the top of the hydraulic tank, and loosen the oil filler cap slowly to release the pressure inside the hydraulic tank. Then operate the steering wheel and control levers several times to release the remaining pressure in the hydraulic piping.

- Loosen the plug at the top of the hydraulic tank filter to prevent the oil inside the hydraulic tank from flowing out.

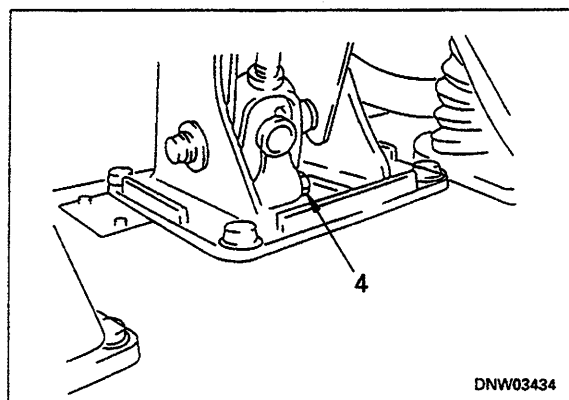
For details, see REMOVAL OF TRANSMISSION; TORQUE CONVERTER ASSEMBLY.

- Remove steering post cover (2).
- Remove 6 plugs and lift boot (3) up.

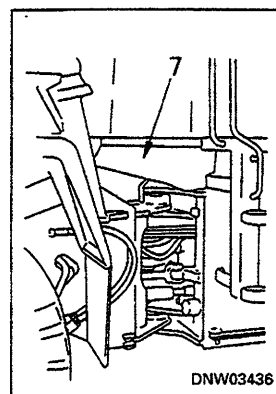
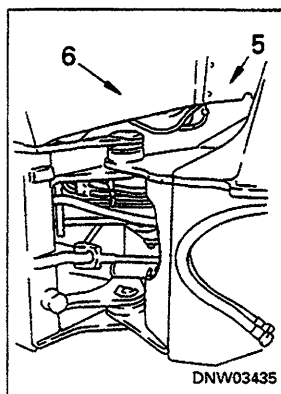


- Remove column connecting bolt (4).

※ I




- Remove covers (5), (6), and (7) under floor.

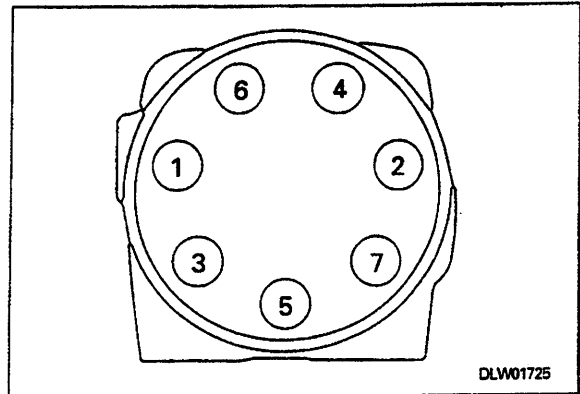


23. Coat thread of screw with grease, and tighten end cap.

★ Install the handle to the spool, and check that the spool rotates.

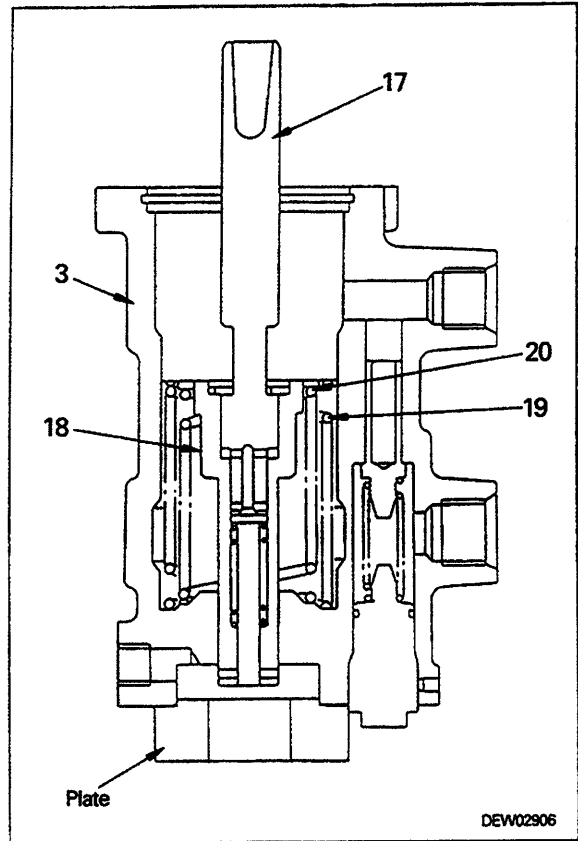
 End cap mounting screw
First step : 14.7 Nm (1.5 kgm)

Second step :
27.0 ± 1.5 Nm (2.75 ± 0.15 kgm)




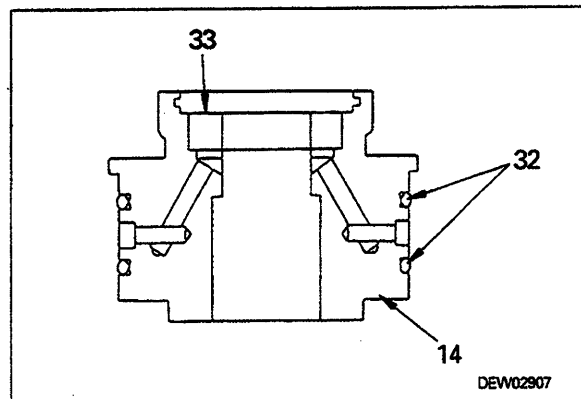
DISASSEMBLY AND ASSEMBLY

- 3) Set body (3) on block.
- 4) Insert springs (19) and (20), and spring seat (18) inside body (3).
- 5) Assemble connector assembly (17).



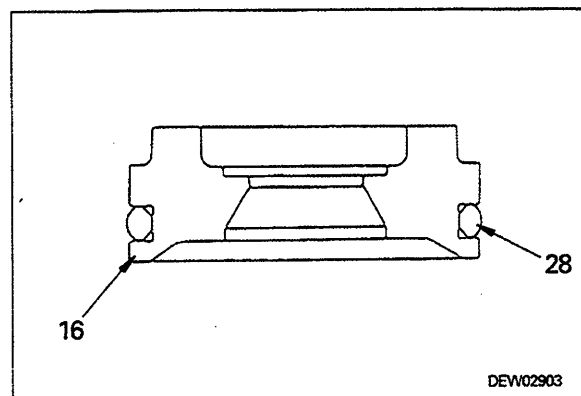
- 6) Assemble O-ring (32) and seal (33) in cylinder cover (14).

 Seal:



- 7) Assemble sealing (28) in power piston (16).

 Sealing: Oil (brake oil)

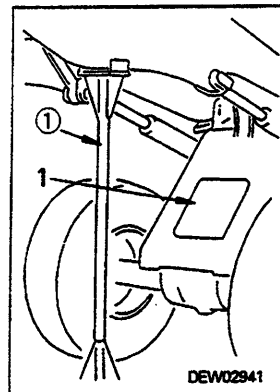


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REMOVAL OF MAIN CONTROL VALVE ASSEMBLY

⚠ Apply the parking brake and put blocks under the wheels to prevent the machine from moving.

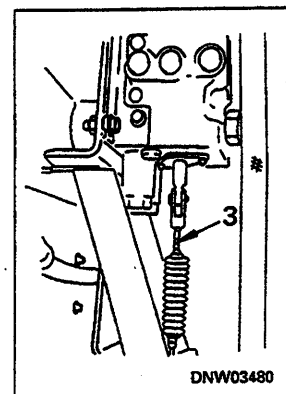
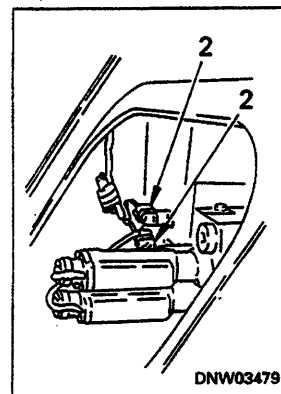
1. Raise boom and set support ① or tool G in position, then remove front cover (1).



⚠ Remove the cover at the top of the hydraulic tank, and loosen the oil filler cap slowly to release the pressure inside the hydraulic tank. Then operate the steering wheel and control levers several times to release the remaining pressure in the hydraulic piping.

- Loosen the plug at the top of the hydraulic tank filter to prevent the oil inside the hydraulic tank from flowing out.

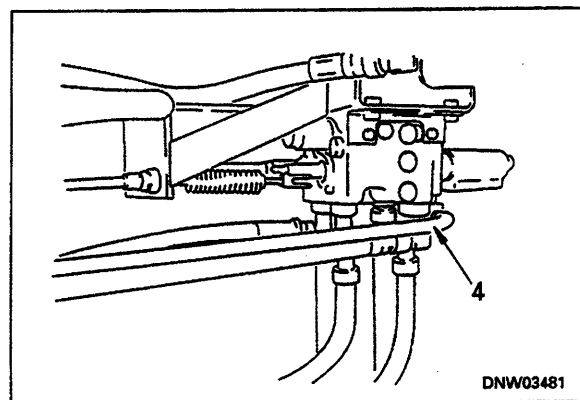
2. Disconnect wiring connector (2) of main control valve.



3. Disconnect work equipment control cable (3) at main control valve end.

4. Disconnect hydraulic piping at main control valve end.

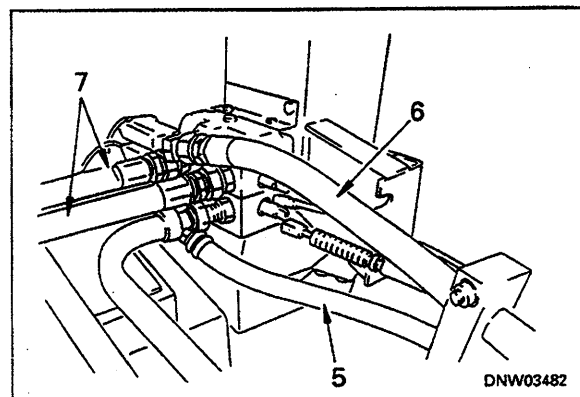
- 1) Hose (4) between hydraulic tank and main control valve



- 2) Hose (5) between hydraulic tank and main control valve

- 3) Hose (6) between priority valve and main control valve

- 4) Hose (7) for bucket cylinder

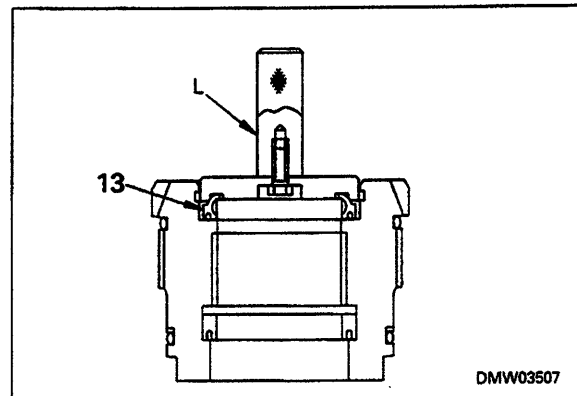
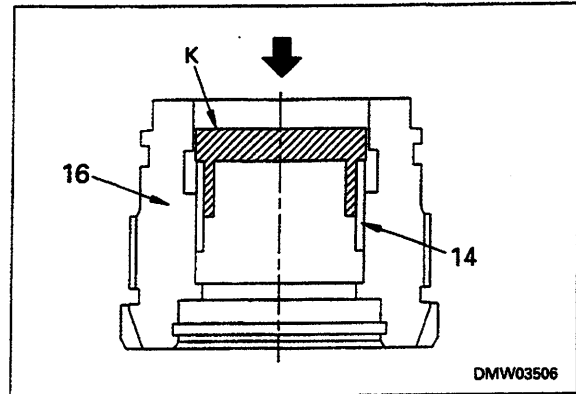


ASSEMBLY OF HYDRAULIC CYLINDER ASSEMBLY

★ Clean all parts, and check for dirt or damage. Coat the sliding surfaces of all parts with engine oil before installing, and be careful not to damage the rod packings, dust seals, or O-rings when assembling.

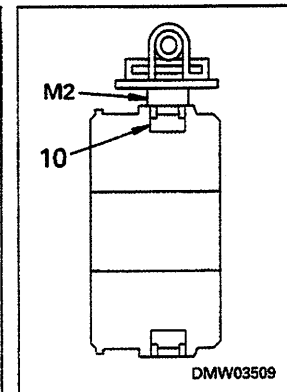
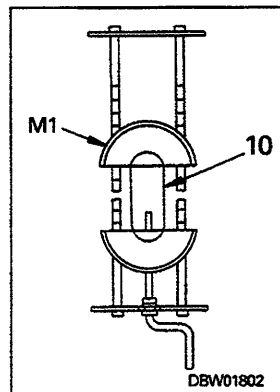
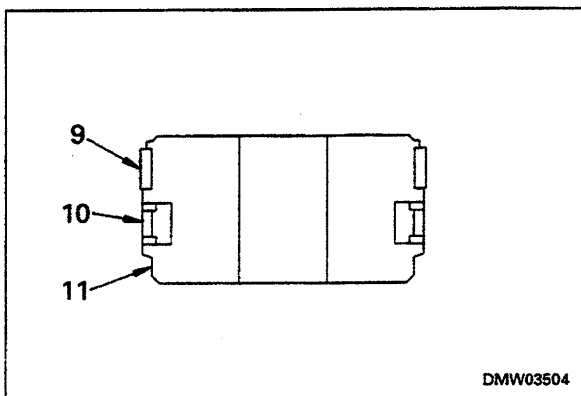
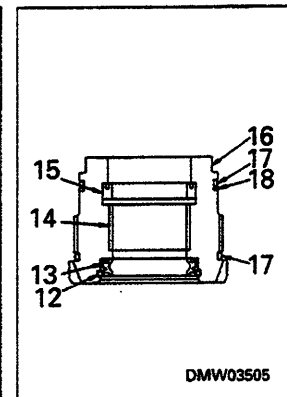
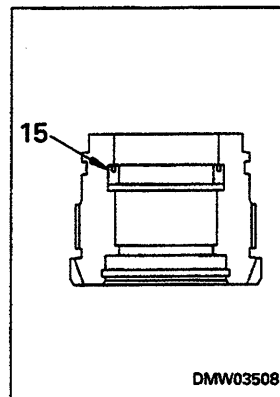
1. Assembly of cylinder head assembly

- 1) Using tool K, press fit bushing (14) to cylinder head (16).
 - ★ Be careful not to deform the bushing when press fitting.
- 2) Assemble rod packing (15).
- ★ Be careful to assemble the rod packing facing in the correct direction.
- 3) Using tool L, install dust seal (13) to head (16).
- 4) Install snap ring (12).
- 5) Install backup ring (18) and O-ring (17).
 - ★ Do not try to force the backup ring into position. Warm it in warm water (50 – 60°C) before fitting it.



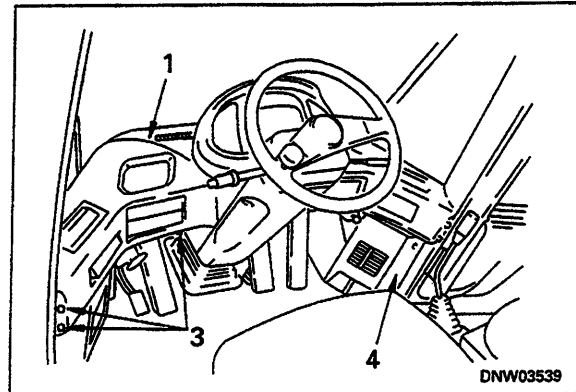
2. Assembly of piston assembly

- 1) Using tool M1, expand piston ring (10).
 - ★ Set the piston ring on the tool and turn the handle 8 – 10 times to expand the ring.
- 2) Remove piston ring (10) from tool M1, then assemble to piston (11).
- 3) Fit piston ring, then using tool M2, compress piston ring.
- 4) Assemble wear ring (9).



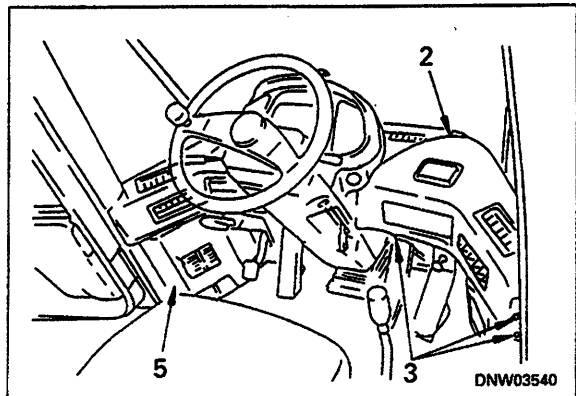
REMOVAL OF CAB ASSEMBLY

⚠ Stop the machine on level ground and install the safety bar on the frame. Lower the bucket to the ground and stop the engine. Then apply the parking brake and put blocks under the wheels to prevent the machine from moving.



1. Remove mounting bolts (3) of left and right dashboards (1) and (2).

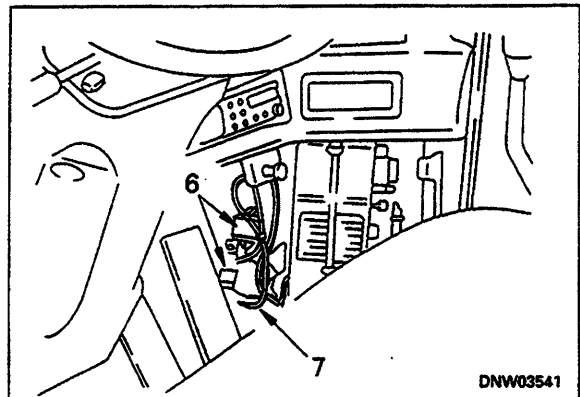
2. Remove right cover (4).



3. Remove left cover (5).

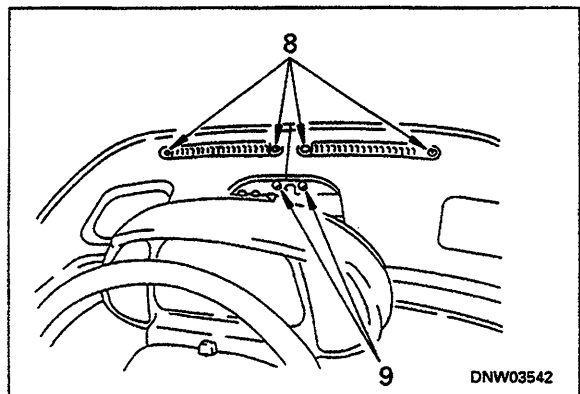
4. Disconnect electric wiring at connectors (6).

5. Disconnect window washer hose (7).
★ Make marks to distinguish the parts.



6. Remove mounting bolts (8) of left and right dashboards, then remove left and right dashboards (1) and (2).

7. Remove steering post and cab mounting bolts (9).




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INSTALLATION OF AIR CONDITIONER UNIT ASSEMBLY

- Carry out installation in the reverse order to removal.

※ 1

 **kgm** Tube mounting bolt:
9.8 ± 2 Nm (1.0 ± 0.2 kgm)

- ★ Coat the O-ring with compressor oil ND-OIL8.

※ 2

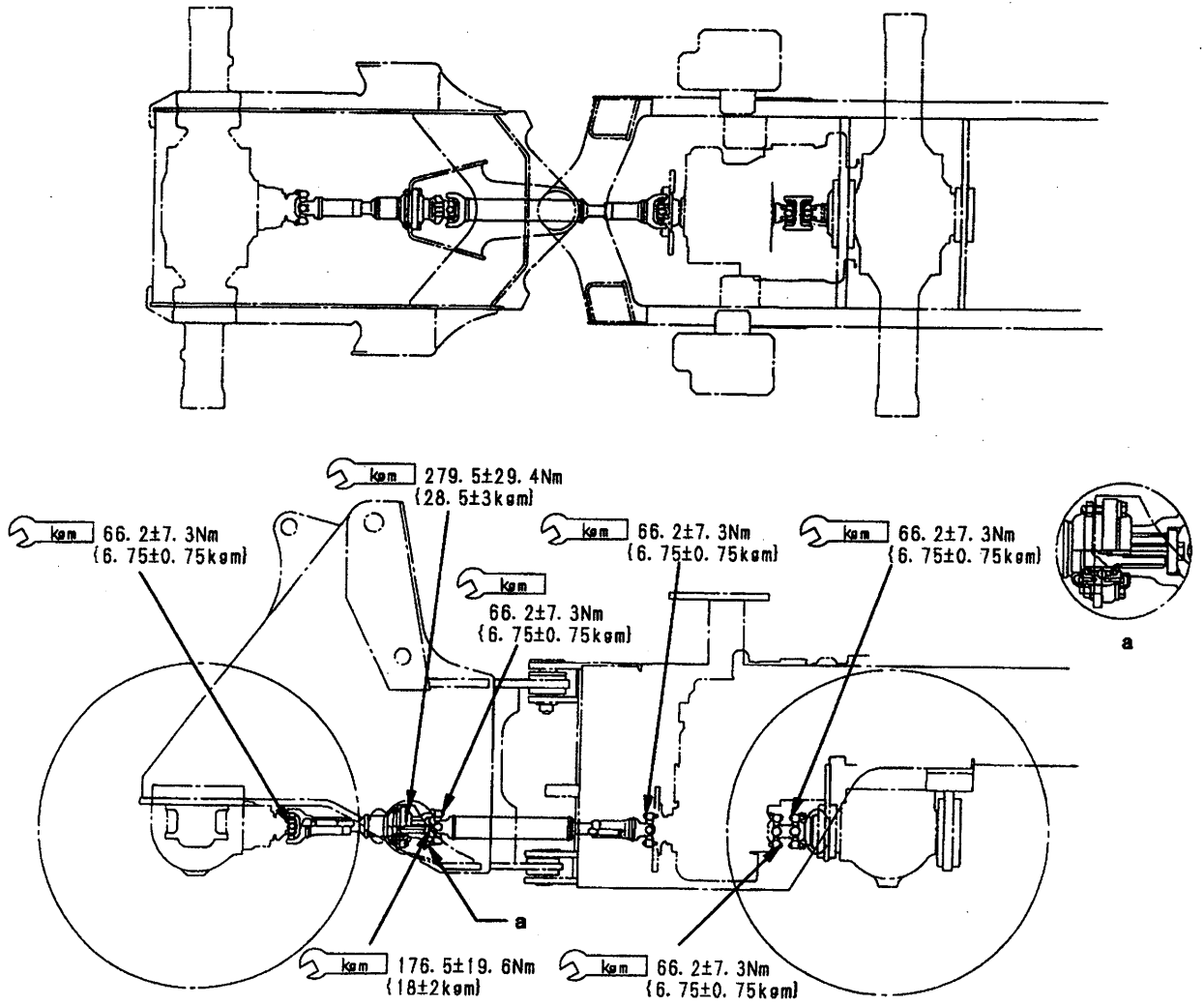
- ★ Pass the air conditioner drain hose through the floor support grommet.
- Fill the air conditioner with new refrigerant.
 - ★ **Precautions when filling air conditioner line with new refrigerant**
 - 1) Keep the temperature inside the room at above 3°C.
(If the temperature is below 3°C, the system will not work.)
 - 2) Use R134a as the refrigerant.
 - 3) When filling with refrigerant, always use the repeat vacuum method to completely evacuate. (Attainment of vacuum: Min. 750 mmHg.)
 - 4) Charge with 1.5 – 1.6 kg of refrigerant.
 - 5) Do not use the can of refrigerant upside-down or use any other mistaken method. Be careful not to let liquid freon get into the refrigerating system.
 - 6) Do not operate the compressor before charging with refrigerant.
 - ★ Check the oil level in the compressor.
(Specified oil level: 150 ⁺¹⁴/₀ cc ND-OIL8)

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
1	Clearance between pump drive shaft and bearing	50	+0.025 +0.009	0 -0.012	-0.009 - -0.037	—	Replace
2	Clearance between pump drive shaft bearing and housing	90	0 -0.015	+0.022 -0.013	-0.013 - 0.037	—	
3	Clearance between pump drive shaft and bearing	35	-0.009 -0.025	+0.041 +0.025	0.034 - 0.066	—	
4	Clearance between pump drive shaft bearing and housing	47	0 -0.011	+0.014 -0.011	-0.011 - 0.025	—	
5	Clearance between pump drive shaft and bearing	50	+0.025 +0.009	0 -0.012	-0.009 - -0.037	—	
6	Clearance between pump drive shaft bearing and housing	80	0 -0.013	+0.018 -0.012	-0.012 - 0.031	—	
7	Clearance between pump drive shaft and bearing	35	-0.009 -0.025	+0.041 +0.025	0.034 - 0.066	—	
8	Clearance between pump drive shaft bearing and housing	47	0 -0.011	+0.014 -0.011	-0.011 - 0.025	—	
9	Clearance between idler shaft and bearing	60	+0.023 +0.011	0 -0.022	-0.011 - -0.045	—	
10	Clearance between idler gear and bearing	110	0 -0.015	-0.020 -0.042	-0.005 - -0.042	—	
11	Clearance (R) between FORWARD/REVERSE clutch bearing and housing	90	0 -0.015	+0.022 -0.013	-0.013 - 0.037	—	
12	Clearance (F) between FORWARD/REVERSE clutch bearing and housing	90	0 -0.015	+0.035 0	0 - 0.050	—	
13	Clearance (R) between 1st, 3rd clutch bearing and housing	100	0 -0.015	+0.022 -0.013	-0.013 - 0.037	—	
14	Clearance (F) between 1st, 3rd clutch bearing and housing	100	0 -0.015	+0.035 0	0 - 0.050	—	
15	Clearance (R) between 2nd, 4th clutch bearing and housing	90	0 -0.015	+0.022 -0.013	-0.013 - 0.037	—	
16	Clearance (F) between 2nd, 4th clutch bearing and housing	130	0 -0.018	+0.040 0	0 - 0.058	—	
17	Clearance (R) between output shaft and bearing	65	+0.030 +0.011	0 -0.015	-0.011 - -0.045	—	
18	Clearance (R) between output shaft bearing and housing	100	0 -0.015	-0.015 -0.040	0 - 0.040	—	
19	Clearance (F) between output shaft and bearing	60	+0.030 +0.011	0 -0.015	-0.011 - -0.045	—	
20	Clearance (F) between output shaft bearing and housing	110	0 -0.015	-0.015 -0.040	0 - 0.040	—	
21	Clearance (R) between output shaft oil seal and housing	100	+0.4 +0.2	+0.054 0	-0.146 - -0.4	—	

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DRIVE SHAFT

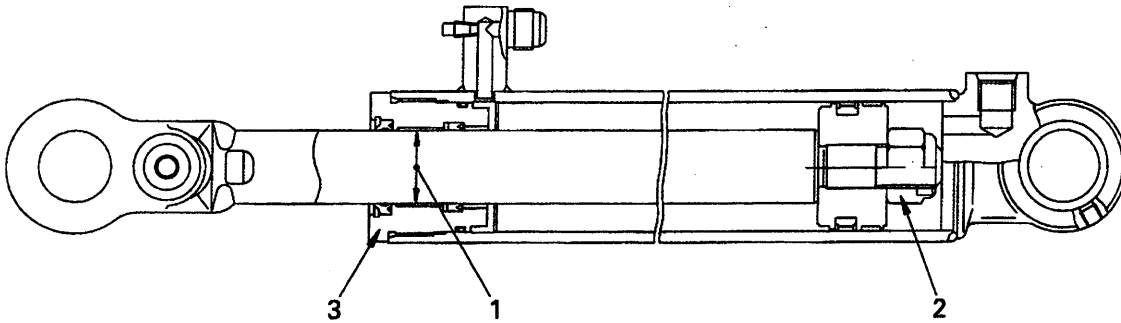


SVW03515

Unit: mm

No.	Check item	Criteria				Remedy
		Standard size	Tolerance		Standard clearance	
	Shaft		Hole			
1	Clearance between upper hinge pin and rear frame	80.5	-0.080 -0.180	±0.05	0.03 - 0.23	—
2	Clearance between upper hinge pin and spacer	65	-0.030 -0.049	+0.24 0	0.030 - 0.289	—
3	Clearance between upper hinge pin and bearing	65	-0.030 -0.049	0 -0.015	0.015 - 0.049	—
4	Clearance between front frame and upper hinge bearing	110	0 -0.020	-0.041 -0.076	-0.076 - -0.021	—
5	Clearance between lower hinge pin and rear frame	65	-0.03 -0.076	+0.046 0	0.03 - 0.122	—
6	Clearance between lower hinge pin and bearing	65	-0.03 -0.076	0 -0.015	0.015 - 0.076	—
7	Clearance between front frame and lower hinge bearing	105	0 -0.02	-0.041 -0.076	-0.076 - -0.021	—
8	Height of upper hinge spacer	Standard size	Tolerance		Repair limit	
		26	0 -0.25		—	
9	Thickness of standard shim between upper hinge and retainer	0.92				Adjust
10	Thickness of standard shim between upper hinge and retainer	1.45				
11	Tighten torque for mounting bolt of upper hinge retainer	14.7 ± 1.47 Nm (1.5 ± 0.15 kgm) (when adjusting shim)				
		66.2 ± 7.35 Nm (6.75 ± 0.75 kgm) (final value)				

HYDRAULIC CYLINDER



SMW01211

★ The diagram shows the steering cylinder.

Unit: mm

No.	Check item	Criteria					Remedy	
		Name of cylinder	Standard size	Tolerance		Standard clearance		Clearance limit
				Shaft	Hole			
1	Clearance between piston rod and bushing	Boom	70	-0.030 -0.104	+0.271 +0.075	0.105 - 0.375	0.675	Replace bushing
		Bucket	70	-0.030 -0.104	+0.271 +0.075	0.105 - 0.375	0.675	
		Steering	40	-0.025 -0.087	+0.132 +0.006	0.031 - 0.219	0.519	
2	Tightening torque of piston mounting nut	Boom	2598.8±259.9 Nm {265±26.5 kgm}					Tighten
		Bucket	3971.7±397.1 Nm {405±40.5 kgm}					
		Steering	411.9±41.2 Nm {42±4.2 kgm}					
3	Tightening torque of cylinder head	Boom	981±98Nm {100±10 kgm}					Tighten
		Bucket	1029.7±103 Nm {105±10.5 kgm}					
		Steering	539±54 Nm {55±5.5 kgm}					

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